



THE BIBLE AND RATIONALISM OR

ANSWER TO DIFFICULTIES IN THE
MOSAIC COSMOGONY, ANTHROPOLOGY
AND BIBLICAL CHRONOLOGY £2 £2 £2

BY
REV. JOHN THEIN

PART FOUR





VOL. 17

THE BIBLE AND RATIONALISM OR
ANSWER TO DIFFICULTIES
IN THE MOSAIC COSMOGONY, ANTHROPOLOGY,
AND BIBLICAL CHRONOLOGY

By REV. JOHN THEIN

*Author of "Christian Anthropology," Answer to
Difficulties of the Bible,"* "Catechism of Rodez,"
and "Ecclesiastical Dictionary." : : : : :*



** The present work, under a different title, forms Part Fourth of a new edition of
"Answer to Difficulties of the Bible," completely revised and greatly enlarged.*

PART IV

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Bishop of Cleveland

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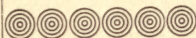


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FIRST PRELIMINARY CHAPTER.

GEOLOGICAL AND PALEONTOLOGICAL NOTIONS.

THE SCIENCE OF GEOLOGY.—Geology is a science which has for object the knowledge of the form of the earthly globe, of the nature of the materials that compose it, of the manner these materials were formed and placed in their actual situation. Lithology, paleontology, and stratigraphy are three important branches of geology: all three concur to the establishment of a complete and exact description of the globe: this purely descriptive part is designated in its whole under the name of geognosy. The studies having for object the explanation of the observed facts, the inquiry of the causes and origins, in one word, the history of the geological world, form a second great division of geology: the geogony. By means of the acquired certitudes, by the authentication of the results, geology seeks to explain in a theoretical manner the nature of the phenomena to which they are due, to determine the order in which they produced themselves, and to assign to them a sort of date, and to fix their probable duration.

The earthly crust is formed of a series of stages whose ensemble form the various geological systems. We consider in geology, a primitive ground formed by rocks whose cooling caused to arise on the surface of the globe various sedimentary grounds or strata, which we now shall study more in particular.

PRIMARY GROUNDS.—The primary grounds are (especially the most ancient) hard and crystalline rocks: such as the micaceous schists or slates, quartzites and graywackes, crystalline limestone (marbles). Hence why the rocks, between the primitive rocks and the sedimentary formations, are also called *grounds of transition*. But, after the Cambrian period, this characteristic is found only there where the dislocations of the soil have exercised a metamorphic action, like in Western Europe.

The *Primary Grounds* attain sometimes a thickness of several thousand yards; in North America until 16,000 yards. They represent the following ages: the *Cambrian*, the *Silurian*, the *Devonian*, the *Carboniferous*, and the *Permian*.

1. The *Cambrian* age has for basis crystalline schists. Hence the sea was still charged with various silicates. In the second stage *graywackes*. 2. The *Silurian* age contains at its basis, all kinds of sedimentary rocks; above this, in the dislocated grounds, *graywackes*, *slates*, and *marbles*. 3. The *Devonian* age.—In Scotland and in North America the old red sandstone takes up the three strata; elsewhere, the rocks are of different colors: *schists* and *greenish quartzites*,—red schist with *arkose banks*, red or gray schists, then black marble, finally, green grit in thin slabs. 4. The *Carboniferous* age.—(a) *Anthraciferous* (mountain limestone) chiefly marine and calcareous, with rare, dry, and hard combustible; but blacker and more brilliant than the following; (b) *coal stage*, chiefly littoral or terrestrial, composed of *pudding-stone*, *grit*, *micaceous schists*, with numerous coal-layers. 5. The *Permian* age, from Perm, in Russia, is poor in fossils. However we meet therein *labyrinthodonts* of great size (*dinobatrachians*); real reptiles (*e. g.*, *theriodonts*), carnivorous animals whose bones and teeth presented a remarkable analogy to those of the didelphian mammifera (*duplici utero*). It is still the period of the development of the coniferous plants.*

SECONDARY GROUNDS.—The secondary grounds embrace the following three periods: the *Triassic*, the *Jurassic* and the *Cretaceous*.

Generally speaking, these grounds, distinguish themselves by the limestone, which is predominant therein and ordinarily they carry the signs of their formation through living beings (*polypi*, *rudista*, *foraminifera*). Each period is characterized as follows: 1. The *Triassic* period, by *motley grit*, arenaceous formation, imprints as of human hands (*cheirotherium*); different colors according to the diversity of the explored countries. By *muschelkalk* (conchiferous

* Whereas these paleontological characters, generally possessing the red color of the deposits, are common to this ground and to the following (*Trias*), some geologists have united them into one group intermediary to the Primary and Secondary, under the name of *new red sandstone*.

limestone) of marine formation. *Saliferous* and *gypseous shales*, comprising clays or littoral grit (tridactylous imprints).

2. The *Jurassic Period* (Jura Mountains).—The numerous stages of this period divide themselves into two very distinct groups: (a) *Lias*, composed at its basis of gritstone, then of alternate layers of clay and limestone. (b) *Oölite*, or roestone, chiefly composed of calcareous banks, of coralline origin, as is attested sometimes by recognizable forms of polypi; sometimes by the granular weaving (*oölite* is so-called from the resemblance of the rock to the roe of a fish). This period opens in Europe by a depression followed by a gradual emersion. The banks of the basins arose and the center became filled up. Whence resulted the closing of the straits which previously isolated the central plateau of the British and Vosgian massives, and the Anglian-Parisian basin became an interior sea. This period has also its numerous stages divided into two net groups.

3. *Cretaceous Period*.—So called from the fact that in England and Western Europe the geological formations of this period are composed: 1. Of *Greensand*.—From below upward it contains: (a) Great formation of sweet water of England and Northwestern Germany (Wealden beds), contemporary with the Neocomian (marine and coralline of the South); (b) greenish spotted sands; (c) blue clay called Gault; (d) concretionary nodules (phosphate of lime and iron). 2. *Chalk*, properly speaking.—The North of Europe sinks under the seas and new marine layers extend themselves over previously emerged grounds. These layers are formed of microscopic calcareous carapaces belonging to globigerina foraminifera, etc. The white rock that resulted therefrom has received the name of *chalk*. On the contrary, the seas of the Mediterranean region contract themselves and obtain the powerful constructions of the *rudista*, which, soldered together, play the rôle of the polypi. The stages of this sub-period are found in the *Rocky Mountains* with a power of more than 3,000 yards. Birds with facial expression of reptiles.

The *secondary flora* reveals, by dense stems and straight leaves, a climate rather dry than damp. The seasons are already distinct as is indicated by the ringed trunks of annual increase, and, in the period of chalk, properly speaking, the poles are sufficiently cooled that the palms could disappear from the arctic regions, that the

dicotyledons with caducous leaves revealed themselves and that the coralline formations confined themselves to the south of the European axis. The *reptiles* held the actual place of the mammifera and were very vigorous under a still too thick atmosphere for the most delicate senses of the latter. The atmosphere forcibly warehoused the solar heat until the poles, and it was only in this calcareous sub-period that there appeared with brilliant colors, the flowers and the butterflies, friends of pure air not overcharged with vapors.

TERTIARY GROUNDS.—Europe and the rest of the continents accentuate their reliefs by the successive rising of high mountain chains. The actually emerged formations were confined in restrained basins, circumscribed by reliefs (Parisian, Pyrenean, and Mediterranean basins); they filled up these basins. They are especially coarse detrital or disaggregated deposits, accumulated in the water, sometimes marine, sometimes sweet, sometimes brackish, and with which gypsum and gem salts are frequently associated.

The mountains, which arose in the midst of a still very warm atmosphere, cause abundant falling of rain, and the latter give rise to vast lakes in the depressions. At the same time, the internal activity awakened. *Grand eruptions*, whose actual volcanic phenomena are only faint consequences, took place on the globe. The clefts, reopened or newly formed, enrich themselves with minerals (especially with gold and silver). The increase of the continents in extent and in elevation contributes toward establishing the *variety of the climates* and offers to life a *stable and well watered soil*. Hence, (a) localization of the faunas and floras; (b) prodigious expansion of the higher animals and of the terrestrial vegetables.

Terrestrial Flora.—The kingdom of the gymnosperms is of limited extent; the preponderance belongs to the palm-trees and to trees with caducous leaves; the prairies cover themselves with gramineous plants proper for the nourishment of herbivorous animals.

Terrestrial Fauna.—Apparition and kingdom of normal mammifera, especially of hoofed herbivores, at first pachyderms (to-day strongly in the wane for the variety of the types), then ruminants. The carnivorous animals develop themselves only about the end. The birds of modern types multiply themselves.

Marine Fauna.—Waning of the brachiopodes and of the cephalopodes (the ammonites have disappeared); predominance of the gasteropodes and of the lamelli branchiata. However we have to remark that this preponderance explains itself in part through the quite littoral character of the most of the Tertiary formations emerged to-day.

The Tertiary grounds are divided into three periods, distinguished: 1. By the relative number of the actual specific forms represented by the Tertiary mollusks; 2, especially by the great movements of the soil that put an end to each of them.

I. EOCENE PERIOD.—(Dawn of the actual forms: 3 or 4 per cent of the actual species of mollusks.)—It ends by the principal rising of the Pyrenees and of the Apennines, which carried the nummulitic limestone to great heights.

In Northern Europe: Petrology.—The coarse (marine) limestone and the gypsiferous marls of Paris (Parisian stage); the London clay, great formation of the contemporary estuary of the coarse limestone; the lacustral limestone with gypsiferous clay of Velay; the lignites of the Baltic with clammy amber of insects; the pisolitic limonites of Franche-Comté, of Bresse and Berry; the phosphorite pockets of Quercy.

Paleontology.—Bones preserved by the gypsum and the phosphorites of several terrestrial vertebrates: *pachyderms* (paleotherium, lophiodon, anoplotherium); of some *ruminants* about the end (xiphodon), of *great pedestrian birds* (gastornis); among the marine vertebrates or of brackish water, gasteropodes of great size (cerithium, melania, fusus) and non-microscopic foramifera (nummulites, orbitolites, miliolites, or triloculates). The nummulites owe their name to their resemblance with thin pieces of coins.

In the South of Europe.—The nummulitic ground, together with the marine limestone was formed by organisms, especially by large nummulites. The nummulitic formation differs from the other Tertiary deposits by its pelagic character and its great extension: indeed, it prolongs itself, from the Pyrenees, through Spain, Algeria, Italy, Greece, Egypt, Asia Minor, Persia, India, and China. The *nummulitic sea* formed, by its invasions, a Mediterranean four or five times as large as the actual sea, and extended from the tropic to the central massive of Europe and freely communicated with the sea of the Hindoos. It gave to the eocene

climate of Europe an entirely tropical character, as is proved by the cocoa-trees found in England.

II. MIOCENE PERIOD.—(Less of recent forms than in the Pliocene: 20 per cent of the actual species of mollusks.)—It ended by the gigantic risings of the Alps, of the Himalaya, etc., which gave to the continents, about exactly, their reliefs and their actual contours.

1. *Stratigraphic and Petrologic Characters*.—The south of Europe was emerged; but the north, during a certain time, was invaded and cut up into an archipelago by the *Falunian* or *Molassic* sea, so-called from its characteristic deposits. The *Faluns* are marine deposits formed of broken shells, of polypi, of generally movable and friable, white or yellow sands; their classic region is the ancient Touraine (France). The *Molasse* is a littoral formation of calcareous or clayish grit, easy to fashion. Its classic region is Switzerland, where it alternates with conglomerates; we find its equivalent in the lower Himalayan hills. Great lakes occupied at that time a part of Switzerland and of several plains and valleys of France. The basaltic and trachytic overflowings attained immense proportions in the Auvergne, the Rhine Valley, the western declivity of the Rocky Mountains, etc.

2. *Paleontological Characters*.—*Fauna*.:—1. The properly so-called pachyderms continue through species of which some have persisted until our time (rhinoceros, tapir, anthracotarium, sus, paleochaerus, hippopotamus). The hipparion was in Europe the precursor of the horse, whilst America possessed the species *Equus* from the *Eocene* period. Also the proboscidean pachyderms appear and dominate (mastodon, dinotherium). 2. About the end of the period commences the kingdom of the ruminants (cervus, antelope, camelopardalis). 3. The cetacea appear (squalodon, halitherium, whale, dolphin); the carnivora (jaguar, hyena) and the quadrumanes (dryopithecus) become very powerful. *Flora*.:—It was, in Europe and in America, subtropical and of a wonderful richness.

Between the *Eocene* and *Miocene* periods, they place to-day an *oligocene ground*, formed of the last layers of the Eocene, and especially of the first stage of the Miocene. The Oligocene period is characterized in Europe by the predominance of the lacustral regimen; it ends by the forerunning movements of the definitive rising of the Alps and of the Jura Mountains, movements which,

in accentuating the reliefs, introduce the regimen of the rapid rivers throwing their water into the Molassic sea.

III. PLIOCENE PERIOD.—(More recent forms than in the Miocene: 40 to 50 per cent of the actual species of mollusks.)—Its end is perhaps marked by the rising of the Andes. It comprises only one stage, the subapennine stage, and forms the *transition to the modern era*. It is separated from it by the following characters: strongly inclined sediments or raised in several places (layers of 600 yards thick were carried away, in Sicily, to a height of 900 yards). Living nature is still too exuberant and not sufficiently diversified to receive its king. 1. *Stratigraphic and Petrologic Details*:—(a) Some marine deposits from gulfs or estuaries; (b) lacustral deposits; (c) torrential deltas and alluvial gravels; (d) basaltic beds. Among the deposits of the first two classes, we can cite: those of Vienna and of the Lower Danube, which extend until Asia through Southern Russia; the saliferous beds of Wieliczka, in Poland. Among the formation of the two latter classes, they cite the auriferous alluvions (placers) of California and of Australia, protected by basaltic beds. 2. *Paleontological Traits*: (a) *Fauna*.—Great proboscideans (mastodon, soon retired into America, *elephas meridionalis*); species of the *rhinoceros* and of the *hippopotamus*, *cervus*, and *bos*; the species *equus* appears in Europe; the apes leave this country. It shows a temperate climate: oak, beech, maple, poplar, walnut-tree, larch-tree, leaving chiefly their imprints in the volcanic ashes of Cantal (France).

POST-TERTIARY (English style), *Quaternary* (French style) *Grounds*.—The Post-Tertiary or Quaternary era does not notably distinguish itself from the preceding era except by the *appearance of man*. It presents no important changes in the marine fauna and in the reliefs, and its shallow sediments continue until at present. It is somewhat divided into two epochs, the *diluvial* or *glacial epoch* and the *actual* or *contemporary epoch*. The first alone belongs to the geological past and solely distinguishes itself: first, by the extraordinary power of its alluvial and glacial phenomena; secondly, by the gradual extinction of animal species (great mammifera, especially herbivora). Very important by its connections with the beginnings of human history, it is unfortunately very obscure on account of the difficulty to establish the order of suc-

cession of its deposits. The facts studied are besides restrained, for the most, to Europe and North America, and it is most prudent not to generalize them.

Let us throw a glance: 1. On the diluvian fauna and on the monuments of man's existence; 2. On the diluvian and glacial deposits; 3. On the succession and remote cause of the facts.

I. DILUVIAN FAUNA. — HUMAN REMAINS. — FAUNA. — The mammiferous fauna, which alone is characteristic of the epoch, offers, in each region, besides the actual species: first, species extinct to-day; secondly, species emigrated since toward the south or north.

1. In *Western Europe*, they believed to be enabled to distinguish three ages, characterized by such or such a species: (a) *age of the elephas antiquus*, with rhinoceros Mercki, and hippopotamus major; (b) *age of the mammoth* (*elephas primigenius*) with a thick mane, and of the rhinocertichorhinus, with chambered nostrils and woolly skin, with ursus spelæus and hyena spelæa; (c) *age of the reindeer* (*cervus tarandus*), emigrated to-day toward the north, with the aurochs (*bos urus*), withdrawn into the east of Europe. 2. In *North America*, the proboscideans reign by the subsisting mastodons, the mammoth, etc., accompanied by horses (great species) and edentata. In *South America* reign the great edentata (this order is however not wanting of incisors): megatherium, megalonyx, glyptodon. 3. *Australia* contains mostly marsupials, but of gigantic size.

Human Remains.—Beside some débris of skeletons, they have found in Western Europe numerous instruments made of flint, which represent two successive civilizations: First, that of cut or split stone (exclusively), called the *paleolithic* civilization; secondly, that of polished stone or celtic axes, called *neolithic* civilization, during which, aside of the subsisting usage of cut stone, soon commenced the *bronze* civilization. The first alone is properly diluvian.

The existence of man is not proved for the age of the *elephas antiquus*; but his contemporaneity with the mammoth and rein-

NOTE.—The discoveries by Boucher de Perthes, in the deposits of the Somme Valley, in 1847, of cut flints, and, in 1863, of a human jawbone has been the starting point of the Diluvian or Quaternary man. However, this fact is acknowledged to-day as being of middling value, on account of the doubts raised about the antiquity of the ground and mode of burial.

deer is demonstrated: first, by the numerous layers, in which his bones or cut flints are found together in the same gangué with the bones of these animals; secondly, by pictures of the same animals engraved on ivory of the first and on the horns of the second.

II. DILUVIAN AND GLACIAL DEPOSITS.—These deposits represent the following types:

Diluvian Deposits.	{	1. Alluvions of valleys.	} Gray diluvium.
		2. Loess of plains.	
		3. Red diluvium.	
		4. Caves and breccia; calcareous tufas.	
Glacial Deposits.	{	5. Mountain glaciers.	
		6. Polar glaciers: drift.	

I. ALLUVIONS OF VALLEYS.—The deposits of a valley form, in general, staged terraces, of which the lowest offer, from below upward, the following elements: (a) Rolled pebbles alternating with coarse sand: bottom gravels; (b) Slimy sand: shore alluvions; (c) Yellowish calcareous mud: Loess; (d) Brownish red clay: red diluvium.

Origin of the Gravels and Sands.—Their numerous alternate layers prove that they are due not only to one diluvian phenomenon, but to alluvions of several successive inundations. Only the water-courses which dragged along the pebbles and gravels on a bed of considerable size peculiarly surpassed their actual conditions of declivity and volume. (*v. g.*, the *Somme* had then a width of more than 3,000 feet; the *Seine*, extending at Paris over a bed of nearly 20,000 feet, must have rolled, during great swellings, over thirty times more water than to-day.)

Diggings of Valleys.—They must have commenced their excavation right away after the rising of the great mountains (Pyrenees, Alps, etc.), due to the declivities thus created and to the abundant rains demonstrated by so many Miocene and Pliocene lakes as well as by the large surfaces of alluvions, very probably Pliocene alluvions, extended at the foot of the Alps and Jura. They even have remarked that certain valleys of erosion, especially the deep cuts or canyons of the Colorado, in North America, are independent in their outlines, from the direction which the actual form of the reliefs would imprint upon the flowing of the waters, and consequently, that their first furrowing is very ancient. A particular

but significant fact, is the existence at Chelles, near Paris, in the valley of the Marne, at the lowest level, of alluvions, probably of the second, perhaps of the first Quaternary age; thus they are now inclined to admit that the valleys were dug out, whole or in part, at the beginning of the period, and that the Quaternary labor often consisted only in excavations alternating with filling them up again: the filling up commenced when a movement of the soil accentuated the incline of the rivers. Only, at the bottom of a bed deepened quite early, the most ancient gravels are concealed under the most recent.

II. LOESS.—Loess is a clayish mud charged with limestone, of a yellow or clear brown tint; it has a very constant composition and generally hides the alluvions. Moreover, we find it, often with a very considerable power, sometimes concentrated in certain sheltered points, sometimes spread out over the plains and table-lands in very extensive and uniform beds. Thus, in the plain of the Rhine, it covers a vast space, with a thickness from 15 to 30 yards; in the basin of Hoang-ho (China) it constitutes, under the name, yellow earth, deposits of 400 yards' thickness; it covers the *pampas* of South America, *i.e.*, the layer of the *great edentata*. We find it in all heights, until 1,500 yards in Europe and 3,500 yards in China. It is void of all indication of stratification, except at its joining with slopes, where it sometimes presents layers of small pebbles, plunging toward the plain. The Loess of the elevated plateaus appears to be void of fossils; that of the lower plateaus contains especially herbivorous animals and earthly shells not at all deteriorated through a carriage: the mammifera especially belong to the forest types; the shells, friendly to shadow and dampness.

Without absolutely rejecting the division of the Loess, M. de Lapparent attributes it to the almost continual dragging along of the most tenuous parts of the soil of the heights through the trickling down of the waters, during an extraordinary rainy period. Moreover, we notice in the north of France that the Loess is wanting there where the Tertiary basin does not extend itself: indication that its formation is due to the destruction of clayish and sandy grounds, *débris* themselves of Tertiary layers.

III. RED DILUVIUM.—This deposit covers the Loess, in both the plateaus and valleys, and directly the alluvions if there is no

Loess. The distinctive characters are: first, the absence of the calcareous element and the red color; secondly, the presence of flint shivers.

At first they believed to be constituting a distinct deposit; but a more careful inquiry revealed that it is only the result of a superficial alteration of the Loess or alluvions, alteration produced by a cold period, during which the movable deposits froze each winter until a certain depth and thawed in summer. These alternatives, first, kept up that part of the soil in the movable state, which permitted the water to dissolve and to drag along the calcareous element, leaving to the settlement its characteristic dark tint; secondly, they caused the splitting of the flint spread on the surface, whose débris became buried sooner or later into a soft mud. This slimy mud, result of the thawing, often penetrated through crevices until into caves.

IV. CAVES AND BRECCIA TUFAS.—The grottoes and caves, which abound in calcareous countries on the flanks of valleys, were opened and enlarged through powerful subterraneous currents, at the moment when the digging out of the valleys gave an opening to the water which filled the fissures of the soil. We find therein materials of filling up similar to those on the surface: the one are alluvions which penetrated through the lower mouth when the level of the neighboring river still corresponded with that of the mouth; the others were brought on from the upper table-land through the crevices. During calm periods stalagmitic ceilings formed themselves, which neatly separated the gravels and slimes of the different ages.

It is especially in these caves that we find the remains of carnivorous animals: *ursus spelæus*, *hyena spelæa*, *felis spelæa*. Man appears to have sought shelter therein only in the period of the last deposit, that of the slime of the caves, identical with the red diluvium, and covered mostly by the modern stalagmites: his flints and bones abound therein, together with those of the hyenas which he supplanted, the reindeer, horses, etc., which he brought therein.

The *ossiferous breccia* are splits filled with the same red mud. Entire skeletons are found therein, which appears to indicate that these animals were engulfed alive therein.

Calcareous Tufas.—(The travertin and other calcareous incrustations.)—The abundance of tufas, in this epoch, on the flank of

the calcareous valleys is a new proof of an excessively damp regimen, which gave to the springs a considerable volume. The *flora* of which we find imprints therein indicates a more lukewarm climate than the actual climate.

V. MOUNTAIN GLACIERS.—The deposits of the mountains are especially *Moraines* (a line or heap of rocky or earthly materials which the glaciers transport and deposit). All the tops and declivities stripped of snow that dominate a glacier undergo an active degradation whose products it receives. Thus were formed, on its shores, trains of blocks and pebbles of all dimensions: *lateral* moraines. When two glaciers become united, they mingle the moraines of their contiguous shores into one *median* moraine. The blocks of the lateral and median moraines descend with the glacier and, at its head, form there a continually increasing heap: *frontal* moraine. The moraines attest the existence of glaciers, gigantic in extent and thickness. The glaciers of the Alps gradually filled up all the depressions of this massive, as well as the Swiss plain, launching *coulées* until Fourvières, not far from Lyons (France), and arose to more than 3,000 feet above its actual level: protogine blocks (feldspath and quartz, red, gray, or green) from Mont Blanc have crossed the Jura, and, from Bourg to Vienne, an immense cone of dejections extends itself.

All these glaciers have left their traces in the actual valleys, already dug out, consequently, before their development. They had phases of progress and of recoil, as is clearly indicated by the interglacial lignites of Zurich.

VI. POLAR GLACIERS: DRIFT.—On the landings of the arctic regions, the glacial deposits form an almost continuous bed, a real ground called the *Drift*. This ground presents two principal features: 1. *Boulder-Clay*.—The northern regions, like Scotland and Canada, are almost entirely covered with a tenaceous clay, containing, disseminated and without order, angular, polished, and striated stones, and resting upon rocks equally polished, and striated: this is the Boulder-Clay. In lower parts (sometimes however until nearly 1,000 feet high), this deposit is often mingled with rolled pebbles and marine shells.

The Boulder-Clay appears to be due to both the largely spread glaciers and to the floating ice, whose vestiges can be ascertained on shores. The heights on which we find the marine shells gener-

ally prove a phase of depression of the lands or rather of the increasing of the height of the level of the polar seas, sometimes perhaps the ascension of marine ice driven back on the shores.

2. *Erratic Ground of the North*.—The great plain of Northern Europe (Holland, Prussia, Denmark, Gothia, Russia), in a radius of more than 1,000 yards around Stockholm, is covered with gravels, sands, and mud, mingled with blocks and pebbles of Scandinavian and Finlandish production. Blocks were transported, without being blunted, until Poland and Moscow. Toward the east, this ground attains the height of 12,000 feet.

The length of the voyage traveled by large blocks with intact angles, joint with the presence of arctic-marine shells, which they believed of having established, caused them to attribute, till lately, these deposits to a phenomenon of transport through icebergs across submerged plains. But the marine shells appear to be absent from the real erratic ground, and it seems that both the Baltic and North Seas, even with a more elevated level, were not deep enough and too narrow to escape then to a complete obstruction by the ice.

These considerations, strengthened by detailed studies, lead to the probable conclusion that the erratic ground results from both the junction and spreading, on the plains of the north, of the glaciers of Finland, Scandinavia and even Scotland. These glaciers, in their first movement of expansion, stumbled against the hills of Central Europe, then receded and had a second movement of progress, less important than the first. The second moraines stopped in a distance from the first varying from 20 to 70 miles. They were not accompanied by deposits of Loess.

VII. *Remote Succession and Cause of the Facts*.—In the succession of the facts, M. de Lapparent, admits two principal phases: 1. *Damp Phase*.—It is attested: (a) by the width of the beds when rivers rolled their gravel; (b) by the erosions, thick alluvions, and the actually dried-up shots of the Sahara; (c) by the enormous cuttings (canyons) of the plateaus, so arid to-day, of the Colorado. Two cases present themselves. There where the ice does not occupy the valleys, they are the theatre of grand phenomena, sometimes of digging or excavating, sometimes of causing alluvium. In the mountains and in the extreme north, the glaciers gradually assume an enormous extent, less through the progress of the polar

cooling than through the abundance of the atmospheric precipitations. This phase corresponds, indeed, to the first two Quaternary ages, whose fauna and flora indicate a warmer climate than to-day. Stratigraphically, it comprises the great alluvions: the Loess, the first Drift. But it appears that it has to be subdivided into two phases: first, the *large glacial phase*, when the drift attained its first and largest extent (until the 40th degree of latitude in America): this is the *first age*; secondly, the *melting and recoiling phase of the polar ice*, also perhaps of the Alpine glaciers, a phase characterized by the most important formations of Loess: this is the *second age*.

2. *Phase of Dry Cold*.—The water courses diminish in importance; the mountain glaciers follow the variations between the falling of snow and the melting of the ice, both growing less. The outbreak of the cold must have been rapid, for the mammoth and the rhinoceros tichorinus, seized by the ice of Siberia, are found in large numbers with their flesh and hair perfectly preserved. The reindeer, an animal which shuns the fog, but not the dry cold, reigned then in Western Europe. *Man*, who perhaps had appeared in Europe since the preceding phase, seeks shelter in caves: this is the *third quaternary age*, stratigraphically characterized by the second drift and by the red diluvium, which, better than the glaciers, attest the rigor of the climate.

Remote causes of the facts.—To explain the deluges of the rain and snow that characterize the first phase, three hypotheses have been proposed: (a) *Development of the Continents of the Northern Hemisphere in Extent and Especially in Altitude*.—They have remarked that the repeated return of the labor of digging or excavating of the valleys, showing the return of the torrential regimen, implies so many risings: hence it is probable that the European continent (at least) underwent until about the end of the first phase an abrupt movement of rising. Thus the great mountainous masses became more and more powerful condensators. (b) *Pre-*

NOTE.—The *actual phase* or *period* is inaugurated by the return of a moderately damp and temperate regimen. The *peat-bogs* begin to form themselves. A new human race, arrived from the East through Scandinavia, brings along *domestic animals*, destroys or repels the remainders of the mammoth, reindeer, etc., and leaves as monuments the dolmens, instruments, or ornaments of polished stone, the lacustral cities built upon pile-works.

cession of the Equinoxes.—800 years before the Christian era, the sun, more remote from the northern hemisphere in the winter solstice, than in that of the summer, gave at the same time to the cold season in the same hemisphere from seven to eight days more than to the warm season. Therefore the winters were colder for two reasons; whilst the summers of the southern hemisphere were at least as warm as they are to-day. Hence a greater difference of temperature, which determined, in this epoch of the year an exaggerated afflux of vapors from the vast seas of the South toward the table-lands and mountains of the North, where besides the glaciers, by extending themselves, played the rôle of powerful refrigerants.

(c) *Cooling of the Pole*.—Commenced in the middle of the cretaceous period, it hastened, in continuing its normal progress, the appeal of the warm and damp air. Particularly, it could, first, at the beginning of the diluvian period, contribute to produce the first drift; secondly, when the European mountains, on account of their degradation and on account of a phase of a depression of the soil, had lost their condensating influence, it could attract toward the extreme North the great snows, to furnish there the second drift, whilst the temperate region underwent, due to the neighborhood of the polar glaciers and to the displacement of the precipitations, a crisis of dry cold.

SECOND PRELIMINARY CHAPTER.

GEOGNOSY AND GEOGENY.

UNTIL now, we had especially in view the notions in regard to the sedimentary grounds. Let us now pass to the explanation of the eruptive rocks. According to the definition given before, Geology is a science which has for object the knowledge of the form of the earthly globe, of the nature of the materials that compose it, of the manner these materials were formed and placed in their actual situation. The composition of the structure of the earthly globe and particularly of its solid crust is called Geology of observation

or *Geognosy*; the history of the formation of this crust and of the secondary causes that have concurred to this formation, is called *Geology of induction*, or scientific *Geogeny*, generally named *Geogeny*.

I. ELEMENTS OF GEOGNOSY.—1. *Earthly Globe*.—The earth is an isolated globe in the space, whose radius is about 3,975 miles. This globe is slightly swelled at the equator and flattened at the poles: the difference between the radii of the pole and the equator, called flattening, is nearly $\frac{1}{300}$ or about 13 miles. The diameter of the earth to the equator is about 8000 miles. Thus the globe's surface is everywhere perpendicular to the vertical, *i. e.*, to the direction of the weight modified by that of the centrifugal force which the diurnal rotation develops: such a disposition is necessary for the equilibrium of the water of the ocean, which occupies three-fourths of this surface. The average density of the globe is about 5.50. But the most of the known rocks have somewhat less of the half of this density (2.40), and that of the center it appears, on the contrary, can be estimated somewhat more than the double (12.00).

2. *Solid Crust*.—*Heat and Fluidity of the Nucleus*.—The parts of the globe which observation can reach directly are: First, the gaseous envelope (atmosphere); secondly, the liquid envelope (ocean); third, the solid crust. The first two are studied by the geologist only from the view of their rôle in the formation and the destruction of the third. (a) *Solid Crust*.—The exterior accidents of the soil, with which physical geography occupies itself, result most often from its inner structure. It is the secret of this structure which the geologist tries to draw from the earth. (b) *Heat and Fluidity of the Center*.—At a constant depth for each three miles, reigns a fixed temperature. Starting from this depth, the temperature increases *one* centigrade for each 25 or 30 yards. If this progression continues in the inexorable depths (the greatest depth of the mines does not surpass 3,000 feet), we would have, toward 7,500 feet, the temperature of boiling water and, toward 62 miles, a heat sufficient to maintain in fusion the most of the known rocks. The emission of the thermal springs and of the volcanic rocks confirm these accounts. We see also that the movements which have plaited the earthly crust, even in a period close to ours, and which still continue to-day in a certain measure, cannot be well explained except through the existence, under this crust, of a liquid and

igneous bed. Hence there is *one-fourth part of the globe composed of dissolved stone* (at least on its surface), and this is the most considerable portion of the earth. We call this the central or igneous nucleus. Now, we know that the solid covering, exterior of the globe, occupies only about one-sixtieth part of the earthly radius.

3. *Composition*.—The earthly crust is composed of *rocks* and the latter of *minerals* and *fossils*. The rocks are masses, forming by their extent, notable parts of the soil. This name is also applied to little resisting masses (clay, sand). We call subordinate rocks less considerable masses, intercalated in the principal rocks. The minerals are brute and solid bodies which are found in nature: almost all belong to the chemical class of composed bodies. The fossils are traces of organized beings, animals, or vegetables.

4. *Structure*.—The soil, both the emerged and sub-marine, presents reliefs, insignificant relative to the general form of the globe, but important as to the thickness of the crust and as condition of life. The highest summits are those of the Gaurisankar (Himalaya), nearly 27,000 feet, and the greatest depth known of the ocean is nearly 26,000 feet, in the East and near Japan. This gives a difference of level of more than 11 miles. The seas are besides three times more extended than the continents and their average depth several times greater than the elevation of the latter: the average depth of the seas surpasses 12,000 feet and the average elevation of the continents has been estimated to be 1,800 feet. This gives for the seas a volume twenty times greater than that of the emerged lands. To understand the origin of these reliefs, we have to examine the general form of the rocks and their position.

(a) *General Form*.—The rocks are *massive* or *stratified*. The massive rocks are those which present no stratifications. Formed by the cooling of melted masses, they take, under this title, the name of *plutonic* or *igneous* rocks. The stratified rocks are composed of layers or strata, that is, of divisions at parallel faces. Formed by way of deposit at the bottom of the water, they carry the name of *sedimentary* rocks. Between these two great divisions are found the *crystalline* rocks with very irregular strata, which form the basis of the sedimentary grounds and which are derived from the first superficial cooling of the originally melted globe.

(b) *Disposition*.—The reliefs are due to three principal causes,

to which correspond the three different dispositions: First, the water of the sea and rivers dug out basins and valleys. From these resulted escarpments where the cut layers reveal themselves by their collop. Many horizontally stratified hills are only débris and testimonies of the raised grounds. Secondly, the volcanic eruptions formed the conic mountains, composed of running lavas, of scoriaceous beds of ashes, which got entangled therein and more or less sloping toward the outside. Third, the straightening of the sedimentary layers gave rise to many hills and to the high mountain chains. The layers may be diversely plaited, undulated, and distorted. They call *out-throw* a rupture of the two sites of which the same layer does not occupy the same level.

II. ELEMENTS OF GEOGENY.—I. *External Causes*.—The earth furnishes to living beings their dwelling and nourishment. To attain the latter end, it constitutes a threefold machine, whereby the air and water, by their circulation, procure the watering of the soil. Now, a careful inquiry of the effect produced upon the soil by this circulation shows that the working of this machine does not move without wearing, that is, without a continual destruction of the elevated parts and an impulse of their débris toward the bottom. A part of the stratified rocks bears manifest signs of such a detritic formation. The chemical or organic deposits complete the series.

2. *Internal Causes*.—An internal force tends toward repairing the reliefs through volcanic eruptions and the raising of layers. The latter fact, little sensible to-day, goes forth, for the past, from the proofs that establish the primitive horizontality of the now straightened layers. Behold the two principal ones: First, these layers generally present the characteristics of regularly and quietly formed deposits at the bottom of the water over a large extent, which can take place only on a great incline. Secondly, the shells and pebbles are imbedded therein in a parallel manner in the joints of stratification.

3. *Induction*.—Geology, combining the study of the new modifications with the examination of the ancient rocks and their disposition, penetrates into the secret of the formation of the latter. But the phenomena, in the conditions under which they actually take place, cannot explain all. Therefore they have varied, and the difference is so much greater the further we go back in the past. In the interpretation of the most ancient dispositions, we

have for guide only analogies, the general laws of physics and chemistry, experiments by which they seek to reproduce the primitive conditions. From among the hypotheses there result some great geogenic laws, some great facts established by science.

A *first law* established by geogeny is the succession of the formations: succession of sediments, superposed with their different populations of fossils; succession of the igneous rocks which penetrate and risings which dislocate the layers. A *second law*, hardly contested, is the gradual evolution of the globe, from an igneous and informal state, through numerous revolutions, until the state of order and relative stability which we behold.

Geology is besides like the place of meeting of the other sciences, of which it is one of the most beautiful and of the most lively applications, and its study permits the Christian controversy to defend revealed Genesis with the very weapons they had turned against it. To be convinced of this, let us speak as briefly as possible *of the ancient effects of the internal activity*.

Let us inquire: 1. About the dislocations of the earthly crust, of which the rising of the mountains is the most imposing trait; 2. The eruptive rocks, intimately connected with the dislocations; 3. The metallic veins, accessories of these rocks; 4. The facts of metaphorism due to the dislocations and eruptions.

I. DISLOCATIONS AND MOUNTAINS.—1. *Structure of the Raised Mountains.*—(a) *Longitudinal Accidents.*—They are plaits, out-throws, and crushings, disposed, in the same system, in parallel lines. First, *Plaits*. They were produced by a horizontal effort on the layers at once tenaceous and flexible. The salient plaits constitute crests, separated from the longitudinal valleys. Secondly, *Out-Throws*. The plaiting of too rigid layers was accompanied by ruptures parallel with the plaits, with slidings from one lip upon the other. Third, *Crushings*. The little consistent layers were crushed between harder rocks. They were pushed vertically to great heights, in a very varied state of partial plaiting, torsion, and overthrowing.

(b) *Transversal Accidents.*—The lateral driving back could not always produce a line of regular rising. Sometimes this line molded itself into a sinuous curve on the resisting obstacles: this was done by the lines of the Jura and Alps, against the concave bar which the central plateau, the Vosges and the mountains of

Bohemia opposed to them. Sometimes it presents segments which advance upon one another, like the steps of a staircase: this is the case with the Pyrenees. Sometimes certain segments are more powerfully contracted than their neighbors. In these three circumstances, ruptures necessarily produced themselves, which constitute transversal valleys, often with very abrupt walls, for instance, the *hawses* of the Jura.

2. *Causes and Circumstances of the Risings.*—Leopold von Buch, struck by the so frequent presence of the granite rocks in the center of the massives, believed that the mountains were due to the vertical pushing of the eruptive forces. Elie de Beaumont suggested a new theory, founded upon the fact of the outlined plaitings and upon the principle of the central cooling. For him and for all his successors, the original cause of the mountainous dislocations is the contraction through cooling, of the igneous nucleus. The crust being pressed by its own weight upon the reduced nucleus and thus the crust itself forced to contract its surface, there resulted therefrom an enormous horizontal or lateral effort. This effort ended in the plaiting or crushing of the weak parts, with the rents and out-throws. Then the pushing of the granite masses in certain mountainous axes is no longer the cause, but the consequence, and the rising itself is, in part, only relative, for the neighboring soil sunk with too much weight. They have remarked: (a) That the sedimentary stages are much thicker and more complete in the mountains than in the great plains; (b) That these thick deposits have, from the most abrupt side of a mountain chain, the neatly pelagic facial expression (formation of the high sea).

3. *Chronological Value of the Risings.*—The age of a rising places itself between that of the sediments which it has affected by more or less parallel straightenings or out-throws and that of the deposits superposed upon the first without having been touched by the same accidents. One cannot, however, regard the rising as the work of one sole catastrophe. A rising has different phases, in which crisis and catastrophes alternate with long periods of incubation. *V. g.*, the chains of the Pacific, situated between this ocean and the Rocky Mountains.

Ancientness of the General Reliefs of the Globe.—The principal continents designed themselves from the beginning, increased in surface, in cohesion, and elevation with the centuries. Two laws

give the reason for this: (a) In general, *the new accidents had to subordinate themselves to the ancient*. In fact, a mountain chain, by its thick mass, hardened and often injected by crystalline rocks is an obstacle at the foot of which the effort of plaiting rises to a high pitch through the very resistance. A new rising never crosses an ancient, but often it set back against it. (b) A sphere which interiorly contracts itself tends to assume a *polyhedral figure whose angles accentuate themselves more and more*. Recently, Mr. Lowthian Green has found the formula of the retreat, by connecting the earthly reliefs in a tetrahedron, of which Asia, Europe with Africa, America, and a hypothetical Australian continent form the summits, whilst the Atlantic, Pacific, and Indian Oceans together with the Boreal form the aspects opposed to these summits. We have to remark that the mountainous plaitings do not constitute alone the great reliefs of the globe: there are very high plateaus with sensibly horizontal or simply arched layers, such as those of the Colorado between the Rocky Mountains and the chains of the Pacific. (c) *Relative height and number* of the risings in the different epochs: the Tertiary chains are more elevated than the primary chains. There are two reasons for this: First, the denudation of the ancient chains; secondly, the increasing thickness of the crust, whose recent plaitings must have been, on account of this fact, gigantic. As a set-off, the recent plaits are less numerous, for they result from a more prolonged effort against a greater resistance. (d) *Rôle of the Risings*.—Each of them has modified in certain places the labor of sedimentation, giving to the erosion of new materials and impressing upon them new directions. They have exercised a still more general influence upon the climate and life, in changing the reliefs, the extent, and contours of the countries.

II. ERUPTIVE ROCKS.—We have to remark first that these rocks present themselves under three quite different aspects: 1. In masses, generally of granite, porphyry, and trachyte; 2. In beds and *coulées*, generally of basalts, modern lavas, etc.; 3. In veins or dikes, more or less thick walls, formed by the filling up of a split, and which especially take the name of dikes if they jut out on the surface of a denuded soil. The latter aspect indistinctly becomes to all the eruptive rocks. This posed, let us see:

1. *Eruptive Origin*.—It can be recognized either directly or indirectly. *Directly*, if the rock has a vein, or if it is connected

with a vein that could not have been filled up from the outside; or *indirectly*, but in a manner that is not always conclusive, because the rock resembles to other certainly eruptive rocks. 2. *Relative Age*.—It can be determined by the following means: (a) The veins that cut and reject the others are of more recent date. We call *rejection* the want of correspondence of the segments of a vein on either side of a split that crosses it. (b) A vein that penetrates a stratified rock is posterior to it. (c) On the contrary, the rolled *débris* of an eruptive rock in a stratified conglomerate prove the priority of the eruption to the sediment. (d) If the projected blocks, of ashes turned into tufas, are interstratified in the sediments, their age is determined by the two encased layers and sometimes by the united fossils. (e) But if there is question of a *coulée*, it may have infiltrated itself between the two layers, and, consequently, may be posterior even to the upper layer. (f) Finally, a split, filled up or not by a vein, is, in general, contemporary with other splits, out-throws or lines of rising to which it is parallel, constitutes a starting point.

III. HISTORY OF THE ERUPTIVE ROCKS.—One must distinguish between the ancient series and the modern series, well separated by the time and their nature. By *the time*, the ancient series belongs to the Primary Era and to the Trias, and the modern series, to the Tertiary and Quaternary series; the Secondary Era (jurassic and cretaceous) is a time of rest. By *their nature*, the ancient series presents the acid and plainly crystalline types; the modern series, the basic types with vitreous elements. However, we have to remark that about the end of the Primary Era, the outflows assume characteristics that approach them to the modern series (*e. g.*, traps, melaphyres).

Ancient Series.—1. Granitic period, essentially *Cambrian*: granite properly speaking, with syenite, diorite, etc.; 2, granulitic period, of the Silurian or Devonian: white mica granite and its congenerous, with diorite, elvan; 3, porphyric period, corresponding to the carboniferous period: it commences with the granitoid porphyries and ends with the eurites and traps; 4, melaphyric period, of the Permian to the Trias melaphyres, gabbros, with serpentines.

Modern Series.—Great eruptive phase of the Miocene to the modern epoch, with apogee in the Pliocene. Almost everywhere,

it opens by an outflow of basalt, continues by emissions of trachyte and ends by a real deluge of basalt. The latter basalts affect the structure in hexagonal prisms. As to the extinct volcanos with intact craters, they are necessarily, on account of their state of preservation, posterior to the diluvial and glacial period. They have thrown out cellular lavas, pozzuolana, etc., identical with those of to-day.

Causes of the Differences between the Two Series.—The characteristics of the recent rocks can be easily explained: 1. They are very dense and, consequently, basic, on account of the great depths or of the growing thickness of the crust sent off by the volcanic hearths; 2. They are bullet-like and scoriaceous, on account of their spreading in the free air, under a weak pression, which permits the disengagement of the gases; 3. They are composed of microscopic crystals and even of vitreous elements, on account of their too rapid passage from a high temperature to that of the surrounding air. But whence are derived, for the most ancient rocks of the first series: 1. The complete and large crystallization, even of the quartz, a crystallization which they could not reproduce artificially; 2. The absence of bloatednesses; 3. The liquid enclosures? The latter circumstance reveals, like for the gneiss, an initial state of dissolution as well as of fusion, with a relatively low temperature; the absence of bloatednesses appears to indicate a considerable depression, either of that of the primitive atmosphere, or of that of the solid crust, or at least an extreme slowness in the cooling and consolidation: finally, this slowness of formation is required on account of the beautiful crystallization of these rocks. Hence everything makes us suppose that the granite and congenerous rocks were formed shortly after the solidification of the earthly crust, about under the same conditions of temperature and pression, either under this crust, or in its crevices and fissures.

IV. METALLIC VEINS.—I. *State of the Metals in the Veins.*—The metals are found either in the native state, or in the state of minerals (metals combined with their mineralizators). We distinguish between the non-oxygenous minerals (sulphurs, chlorures, etc.) and the oxygenous minerals (oxides, carbonates, silicates, etc.). The latter are generally derived from the alteration of the first through the superficial oxidate surroundings (air, water). The

metal or its mineral is ordinarily enveloped by a rocky gangue. The veins appear richer at their upper part, there where the cooling precipitated the metal of the vapors or of the thermal water which contained it.

2. *Age of the Veins.*—We must distinguish between the split and its filling up. The age of the split determines itself like the eruptive veins. The age of the filling up may be about contemporary with the production of the split or, on the contrary, posterior: the filling up, indeed, was often the slow work of centuries, and, moreover, a split already filled up may open itself to receive new minerals.

3. *Classification of the Veins.*—There are three great categories, according to the filling up: (a) *Veins of direct emanation*, that is, whose filling up was the immediate result of the eruption. They are connected with the acid rocks, and especially comprise the stanniferous veins. (b) *Veins of concentration*, formed by the gradual concentration of the mineral in certain portions of the split occupied by a basic rock. They have for type certain cupriferous veins. (c) *Concretionate veins*, formed by slow incrustation of the sides of a split, due to the circulation of the water or thermal vapors. They are also in relation with the basic rocks and have for type plumbeiferous veins. To these three categories we have to add some secondary types.

Some Details about the Veins.—The mineral of tin and the cassiterite, which presents itself in heaps rather than in real veins. It is probable that the tin saw the daylight with the quartzose veins, rich in silica and in fluor, in the very state of fluoroid. The *veins of tin* chiefly belong to the end of the Devonian period. The *cupiferous lodging-places* accompany the diorites, serpentines, etc. These veins chiefly belong to the Permian and Triassic grounds: they reappear in the Eocene serpentine grounds. The *galena*, more or less argentiferous, is accompanied or replaced by the mock-ore, as well as the chalcopyrite belong, the one to the Trias with extension into the Middle Lias, the others to the Miocene and Pliocene periods. (e. g., Hartz and Erzegebirge.) *Auriferous Veins.*—They generally accompany amphibolic-eruptive rocks, either ancient (diorite, diabase, syenite) or modern (andesite). They are rich in precious minerals: native gold and silver. Richer near the surface of the soil, they have formed, through the disaggregation of their minerals, in the Pliocene and even in the Diluvian epochs, the auriferous

sands of California and of Australia. *Calamiferous Lodging-Places*.—The veins properly speaking often extend themselves into heaps, at the passage of certain little resisting rocks, and at the same time a transformation of the mineral may take place. This phenomenon has for type the deposits of calamine formed at the meeting of the mock-ore veins with the limestone. *Lodging-Places of oxidated iron*, in the contact with granitic massives; magnetite, in heaps in certain primitive grounds in the neighborhood of amphibolites (Norway).

V. METAMORPHISM DUE TO INTERNAL CAUSES.—Three kinds of action have hardened the sedimentary rocks in rendering them more or less crystalline and in impregnating them often with new elements. (1) *The Mechanical Action of the Risings* (Regional metamorphism).—In fact, the lateral compressions and the orogenic movements that follow produce two effects: they cause the schistous rocks, in the perpendicular way to the compression, through the sliding of the parts one upon the others; *e.g.*, *slates* (oblique or even perpendicular schistosity in the strata). They develop a considerable heat, and this heat, operating on the compressed and damp rocks, renders them crystallines (crystalline marbles). (2) *The Action of the Emanations* (Peripheral metamorphism).—*Ordinary Case*.—The liquids and the vapors that accompany an eruption infiltrate themselves into the neighboring rocks and form there a metamorphic aureola, which may extend itself to several hundreds of yards. The change is sometimes a hardening due to siliculous impregnations, sometimes to a chemical and crystalline overrunning. *Extraordinary Case*.—If the emanations become mingled with sea water or lake water, they may produce a more extensive metamorphism, in setting upon recent sediments, susceptible of profound impregnation, *e.g.*, the transformation into dolomite of the Triassic limestone of Tyrol. (3) *Metamorphism of Contact*.—It may produce itself, either chemically or physically: (a) *Chemically*, by the development of minerals whose elements are derived from both the eruptive and encased rock—they are generally the *silicates*. This change produced itself especially with the contact of granitoid rocks; the volcanic rocks are incapable of producing it. (b) *Physically*, by simple calcination. This effect, the most restrained, is peculiar to the volcanic rocks.

After these preliminary notions, let us now discuss the Mosaic Cosmogony, and see how far it is in accord with modern science.

CHAPTER I.

THE MOSAIC COSMOGONY.

THE Mosaic Cosmogony, that is to say, the history of the creation of the world related by Moses in the first chapter of Genesis, has given rise to a great number of objections of various kinds. Some are drawn from the form of the narrative, others from the groundwork. They contest its antiquity on account of the language of the author; they alter the sense, character, and import thereof; they especially maintain, in a multitude of writings, published under all possible forms and in all the languages, that what the sacred author teaches us about the origin of the world is irreconcilable with the accounts of modern science. We are going to answer successively to all these difficulties. We shall establish in the first place the antiquity of the account of the creation; then we shall study its character and the lessons contained in the account of creation.

ANTIQUITY OF THE CREATIVE ACCOUNT.—Wellhausen pretends to prove by philology the recent origin of the account of creation. According to him, it could have been drawn up only after the Babylonian Captivity, because only then several expressions we find therein became customary. 1. The first word of Genesis, *beré sît*, was unknown to the ancient Hebrews, in the sense of "In the beginning." They said *bár isónáh*, *battéhilláh*, not *beré sît* (Prolgomena, p. 411). False assertions. Although the new critics deny the authenticity of many passages anterior to the Captivity where we read the word *beré sît* in the sense of "In the beginning" (Deut. xi. 12; Is. xlvi. 10; Job viii. 7; xlii. 12), they do not dare to deny the antiquity of other passages where we find the contested word (Prov. xvii. 14; Osee ix. 10; Mich. i. 13, etc.). 2. According to Wellhausen the word *bárâ*, expressing the action to "create from nothing," supposes a too advanced philosophical culture to be anterior to the Babylonian Captivity. Reasons of this kind prove nothing against the facts. The proof that *bárâ* was used in this sense before the end of royalty, is that we read it in the ancient Psalms and Prophets (Ps. li. 12; lxxxix. 13, 48; ciii. 30; Is. iv. 5; Amos. iv. 13; see also Deut. iv. 32). 3. Wellhausen quotes also as recent expres-

sions in the account of creation *tôhu wâbôhu** (Gen. i. 2); *hibdîl* (i. 4, 6, 7), "to separate"; *raqîa* (i. 6-8, 16, 17, 20), "firmament"; *yammîm* (i. 10, 23), "the great sea"; *mîn* (i. 11, 12, 21, 24, 25), "kind"; *demût* (i. 26, 27), "likeness"; *zâkâr* and *neqêbâh* (i. 27), "male and female"; *hayyah hâ-rômeset* (i. 21), "creeping beast." All these affirmations are false; we find on the contrary in the first chapter of Genesis words which prove its great antiquity. Let it be sufficient, for instance, to quote the word *tehôm* (Gen. i. 2), designating the sea like in Assyrian, signification whose remembrance the Hebrew language lost later on, just like, in the chapters following, the names of Abel and of Cain, signifying "son."† The meaning of these two words had been lost in such a manner that only by the deciphering of the cuneiform inscriptions, in the last century, they were enabled to discover its real meaning.

CHARACTER OF THE CREATIVE ACCOUNT.—The first chapter of Genesis is written under the form of a narrative and in prose. They have called it a "hymn," but this expression is not correct, if one employs it in the strict sense, that is to say, as designating a kind of lyric poem. There exists in the Hebrew Bible no chant in prose. Now the account of creation is not written in verses; we find therein neither the measure of verses nor the parallelism, *i. e.*, that characteristic trait of Hebrew poetry which essentially consists in repeating twice the same thought in different terms. They wished to see, it is true, a kind of refrain, indicating a poem, in the systematically repeated forms: "And God saw that it was good"; "And there was evening and morning the first or second day." But this repetition is not a refrain properly speaking; it has for end only to point out the end of a strophe; it is simply destined to relieve the memory and to assist to retain more easily the account, just like the analogous

* The words *tôhu wâbôhu* express the state of chaos, of disorder, and confusion in which the elements of matter were before the organization by the Creator.

† The word *hablu*, *habal*, "son," we read in the Assyro-Chaldaic texts either isolated and employed as common substantive, or as component element of proper nouns, such as Assur-bani-habal, "(the god) Assur has formed a son," Nabu-habal-usur, "(the god) Nebo protects the son," etc. These two names have been preserved by the Greeks under the more or less altered forms of Sardanapalus and of Nabopolassar.

locutions in the genealogical tables: "And such one lived so many years, and he begot sons and daughters, and his days were so many years and he died" (Gen. v., xi.). Before the invention of writing or even when its use was still very rare, the necessity to keep by heart the remembrance of events, obliged to make use, to fix them, of mnemotechnic proceedings, and in particular of identical figures. The Arabic people presents us still to-day a striking example of these primitive customs. The histories and popular stories which transmitted themselves from mouth to mouth are, so to speak, all cast in the same mold. The cosmogony going back to the very origin of man, there is nothing astonishing that it was drawn up under a form easy to retain.

However, the Mosaic Cosmogony, although it is not a poem, properly speaking, was written in a language full of pictures or, if you wish, poetical language. The metaphors therein abound and the narrative thus gains in beauty what it loses in precision. In the beginning, the language could not have had accumulated that treasure of general ideas and of abstract words which make of our modern languages instruments so proper to the expression of the philosophical and scientific ideas; they spoke then only in figures; the invisible world presented itself to the eyes of the mind only under forms and colors borrowed from the visible world, and the imagination beheld under the figure of the sensible things the ideas of the things which did not fall under the senses. Names of material objects were thus chosen to render immaterial conceptions. Such a manner of speaking was little scientific, but it was popular and at the bearing of everybody. The Bible and, in particular, the beginning of Genesis, is a picture-language.

From what precedes, we have to conclude that we must not seek in the Mosaic Cosmogony a scientific exposition of the origin of the world, drawn up with the technical exactitude of the modern savants, in a precise language, using only precise words and of a rigorously determined signification. On the contrary, we find therein metaphorical terms and locutions, consequently somewhat vague; anthropomorphisms, which represent God speaking and acting like man, etc. The task of the exegetist consists, therefore, to disentangle the proper expressions and the figurative expressions, to find out the exact meaning of both. The rule which we must

follow in the interpretation of the sacred text, is to take it in its proper sense, every time one has no serious motive to deviate from it. If a passage, thus understood, is in agreement with the context, is conformable to the accounts of reason or to the analogy of revelation, if it does not contradict the testimony of history or the certain results of science, there can be no doubt about its real signification. But if one or several of these conditions are wanting, it is an indication that this passage must be interpreted in a figurative sense and then we must make use of the lights offered to us by reason, history, or science in order to determine the real sense. These principles posed, we are going to show that the first chapter of Genesis teaches us the doctrine which the Church always saw therein, that it contains no error, and that the scientific objections raised against it have no foundation.

TEACHINGS CONTAINED IN THE ACCOUNT OF CREATION.—According to the Fathers and Doctors of the Church, the Holy Ghost has taught us in the account of the creation of the world several very important truths, and especially the existence of only one and all-powerful God, contrarily to the polytheistic beliefs of the contemporaries of Moses. Moses does not establish, indeed, as a modern philosopher would do, under form of theoretic proposition, that God exists, that He is unique and all-powerful. Nothing is more foreign to the Oriental genius than our Western proceedings of analysis, of methodical and abstract exposition. But Moses affirms the truth under a concrete form as a fact. He tells us that God has acted: he teaches us thereby that He is and the manner by which He acted reveals to us what His nature is.

The Divine act is the act of creation. "In the beginning God created heaven and earth." From this it goes forth: 1. That the world is not eternal, because hereby its beginning is pointed out; 2. That God existed before and outside the world, like the workman is anterior to his work and distinct from it; that, consequently, the creatures are not a part of God and cannot be gods; 3. That the world was brought forth from nothing or, in other words, that it was not formed from pre-existing matter and that it is not derived from God neither through emanation nor through generation. The true sense of the word *bārâ*, employed here by the original text, is that of producing *ex nihilo* or from nothing. The equivalent of the word *ex nihilo* is not found in the Hebrew Pentateuch, because

the language of Moses had no corresponding expression, but the sense which the Bible attaches to the word *bârâ* cannot be contested. Contemporary infidels deny it however, like M. Soury, for instance, when he says: "Modern exegesis rejects the interpretation of creation *ex nihilo* which they often give to the Hebrew verb *bârâ*. This verb essentially signifies *to shape, to cut, to prune*, in the sense to cut the trees of a forest, etc. Far from excluding the idea of a pre-existing matter, it implies it. Moreover, passages like in Gen. i. 27 and ii. 7, for instance, show that the notion of a creation *ex nihilo* has no foundation in the Hebrew text" (J. Soury, *Theories Naturalistes du Monde*, etc. Paris, 48, 49).

Nothing is more false than these assertions. In the first two chapters of Genesis, we find four different verbs to express the creative action of God: 1, *bârâ*, to create; 2, *âsâh*, to make; 3, *yâsar*, to form; 4, *bânâh*, to build. *Bârâ* is used for the creation of the universe (i. 1); for the great fishes of the sea (i. 21), and for man (i. 27). Elsewhere, God *makes* His creatures from the substance already created (i. 7, 16, 25), or He *forms* the beasts of the earth (ii. 19), or finally He *builds* the woman (ii. 22). Cf., Is. xliii. 7. In this verse, Isaias employs the first three words. Not only here, but in almost all the passages of Holy Scripture where find that the word *bârâ*, expresses the creation *ex nihilo* (cf., J. M. Fuller, *The Students' Commentary on the Holy Bible*, 1879, Vol. I., p. 11). This word is reserved to God, He is always the subject thereof, in order to point out the creation of heaven and earth (Gen. i. 1; Is. xlv. 8; xl. 28, etc.). Moreover, God produces the creatures by His only will. The mode of creation in Genesis is the word, that is, an act of the will: "He spoke, and they were made; He commanded, and they were created" (Ps. cxlviii. 5).

It is impossible to point out in a stronger manner that the creatures were brought forth from nothing, because they have no other cause or reason of their existence except the will of God. The most skillful artist cannot produce anything by his only will; he needs a pre-existing matter and instruments to realize his conceptions, but the Creator needs only to will and all that He wills is right away realized. He says: "Let there be light!" and the light was.

The first verse reads: "In the beginning God created heaven



and earth." It indicates the creation of the elements of matter, made by God in the beginning of time. Time, which is only the succession of finite things, commences with the creation of the finite things. What God created, in the first place, were the very elements of the world. The Hebrew language, in want of other expressions, designates them under the name of *heaven* and *earth*, comprising the ensemble of the created things. This first verse is, therefore, not a summary of the whole chapter, as some believed, but it is the affirmation of the divine act producing the primitive creation.

After God had created the elements of matter, He organized them. Moses tells us that God, for this organization, employed six spaces of time, which he calls days. The creation of the elements is outside these six days. The very nature of these days is the subject of numerous controversies and of endless objections for the solution of which they have imagined various systems which we shall soon study. In the next chapter, after having made a rapid review of the superiority of the Mosaic Cosmogony over the cosmogonies of pagan nations, we shall study the Scientific Cosmogony, *i. e.*, 1, *the Cosmic Era*; 2, *the Geological Era*; finally, *the Accord between Science and the Bible*.

CHAPTER II.

THE MOSAIC COSMOGONY (Continued).

ALL the religions and all the nations of antiquity have pretended to explain the origin of things. The various cosmogonic systems have common traits which seem to indicate a community of origin, perhaps even a primitive revelation; but the most of them have been disfigured in the course of the centuries through the addition of childish details, often in flagrant contradiction with the most incontestable accounts of modern science. A single one of these cosmogonies, that which figures at the head of our Sacred Books, has escaped this general corruption in such a manner as to defy still to-day the attacks of infidel scientists. It does not enter into our plan to give here a detailed commentary thereon. To state this cosmogony, to

point out briefly its superiority over the others, to say a word on the scientific cosmogony, and finally the accord of both—such is the end which we have proposed to ourselves in this chapter.

I. THE MOSAIC ACCOUNT OF THE CREATION.—Since we could not discuss the biblical cosmogony without knowing its text, we will give here the literal translation according to the Hebrew, contenting ourselves with grouping the works peculiar to each of the six days into so many special paragraphs: “1. In the beginning God created heaven and earth. 2. And the earth was unformed and empty; darkness was upon the face of the deep; and the spirit of God moved over the waters.”

First Day.—“3. And God said: Be light made! And light was made. 4. And God saw the light that it was good, and God divided the light from the darkness. 5. And God called the light Day and the darkness Night; and there was evening and morning: one day.”

Second Day.—“6. And God said: Let there be a firmament made amidst the waters and let it divide the waters from the waters. 7. And God made a firmament, and divided the waters that were under the firmament from those that were above the firmament, and it was so. 8. And God called the firmament Heaven. And the evening and morning were the second day.”

Third Day.—“9. And God said: Let the waters that are under the heaven be gathered together into one place, and let the dry land appear. And it was so done. 10. And God called the dry land Earth; and the gathering together of the waters he called Seas. And God saw that it was good. 11. And God said: Let the earth bring forth the green herb, bearing seed after its kind, and the tree yielding of the fruit which had in itself its seed after its kind. And God saw that it was good. 12. And the earth brought forth the green herb, and such as yieldeth seed according to its kind and the tree that beareth fruit, having seed each according to its kind. And God saw that it was good. 13. And the evening and morning were the third day.”

Fourth Day.—“14. And God said: Let there be lights made in the firmament of heaven, to distinguish the day and the night, and let them be for signs and for seasons, and for days and years. 15. And let them be lights in the firmament of heaven to give light upon earth. And it was so done. 16. And God made two great lights: the greater light to rule the day, and the lesser light to rule the night,

and he made also the stars. 17. And God placed them in the firmament of heaven to shine upon the earth. 18. And to rule the day and the night and to distinguish the light from darkness. And God saw that it was good. And the evening and morning were the fourth day."

Fifth Day.—"20. And God said: Let the waters bring forth a multitude of living animals and let the fowl fly over the earth under the firmament of heaven. 21. And God created the great marine monsters and every moving animal of which the waters are swarming, according to their kinds, and every winged fowl according to its kind. And God saw that it was good. 22. And God blessed them, saying: Increase and multiply, and fill the waters of the sea, and let the birds be multiplied upon the earth. 23. And the evening and morning were the fifth day."

Sixth Day.—"24. And God said: Let the earth bring forth the living animal in its kind, cattle, the creeping being, and the beasts of the earth, according to their kinds. And it was so done. 25. And God made the wild beast after its kind, and the cattle according to its kind, and everything that creepeth on the earth after its kind. And God saw that it was good. 26. And God said: Let us make man to our image, according to our likeness; and let him have dominion over the fishes of the sea, and over the fowls of the air, and over the beasts, and over the whole earth, and over every creeping creature upon earth. 27. And God created man to His own image; to the image of God He created him. He created them male and female. 28. And God blessed them, saying: Increase and multiply, and fill the earth, and subdue it, and rule over the fishes of the sea, and the fowls of the air, and all living creatures that move upon the earth. 29. And God said: Behold, I have given you every herb bearing seed upon the earth, and all trees that have in themselves seed of their own kind; this will serve you for nourishment. 30. And to all beasts of the earth, and to every fowl of the air, and to all that move upon the earth and wherein there is life, all green herb will serve for nourishment. And it was so done. 31. And God saw all the things that he had made, and they were very good. And the evening and morning were the sixth day." "These are," says the sacred writer in the second chapter of Genesis, "the generations of the heaven and the earth on the day when they were created."

If one contents himself to point out in this wonderful page the successive acts by which the intervention of the Creator reveals itself, he finds nine of them, which present themselves in the following order: (1) Creation of matter; (2) Apparition of the light; (3) Formation of the firmament or of the atmosphere by the separation of the condensed lower waters and of the waters remaining in the state of vapors; (4) Emersion of the continents; (5) Appearance of the plants; (6) Appearance of the sun, moon, and stars; (7) Creation of the aquatic animals and of the birds; (8) Appearance of the earthly animals; (9) Creation of man. As can be seen, two distinct works are attributed to the third and to the sixth days. The division of the works of creation into six days cannot be looked upon as arbitrary and must have had some motive which it is undoubtedly not impossible to discover, that is, the religious institution of the week. As to the order of succession, it is not questionable, and we shall see further on that, on the whole, it is in accord with the accounts of modern science.

II. SUPERIORITY OF THE MOSAIC COSMOGONY.—Although the cosmogony we have just presented has not escaped the attacks of infidelity, which has pretended to see in it nothing but nonsense and contradictions, the most of the Rationalists have acknowledged that it is immensely superior to all the other cosmogonies which antiquity has bequeathed to us. "It contains not one word," says one of them (Dillman, *Genesis*, 1875, p. 9), "which would appear unworthy of God's thought. From the time that the mystery of creation, which will always remain a mystery for man, was attempted to be sketched, in order to render it seizable to human intelligence, it was impossible to trace a more magnificent and more worthy tableau. It is with perfect right that they draw from the creative account a proof in favor of its revealed character." A famous naturalist, who has become, since the death of Darwin, the principal representative of the advanced evolutionary school, Haeckel, Professor of Jena, grants the same praises to the Mosaic history of the creation. He extols in particular "the simple and natural disposition of the ideas exposed therein, which advantageously contrast with the confusion of the mythological cosmogonies of most of the ancient peoples. According to Genesis, the Lord God first formed the earth as an inorganic body. Then He separates the light from the darkness. then the waters from the firm earth. Behold

the earth inhabitable for organized beings. Then God forms, in the first place, the plants, later on the animals, and even among the latter He fashions first the inhabitants of the sea and of the air, and finally those of the firm earth. Finally, God creates the last of the organized beings, man; He creates him to His own image, in order to be the master of the earth." The illustrious naturalist goes so far as to discover the application of his evolutionary ideas in these successive and progressive creations. "Although," he says, "these great laws of organic evolution . . . may be regarded by Moses as the expression of the activity of a creator forming the world, we discover therein, however, the beautiful idea of a progressive evolution, of a gradual differentiation of primitively simple matter. Therefore, we can pay to the grand idea contained in the cosmogony . . . of the Jewish legislator a just and sincere tribute of admiration." (*Schöpfungsgeschichte*.)

In order to fully appreciate the superiority of the Mosaic cosmogony, it will not be useless to cast a rapid glance on the others. Aside from some features which seem to have been borrowed from it, or at least drawn from the same source, what exaggerations, what childishness and extravagances! The *Chaldean* cosmogony, as we shall see more clearly in the next chapter, which in many respects approaches ours, shows us, according to Berosus, the supreme god, Bel, cutting in two his spouse, of whom he makes both heaven and earth; then we have him cutting off his own head, and the other gods modeling men out of the slime impregnated with the blood of the divine victim.. The *Phœnician* traditions transmitted by Sanchoniaton, represent the primitive world in a state of chaos and wrapped in darkness; but at the end of a certain number of centuries, they add, the Spirit and the chaos united to produce the world. In *India*, we have two cosmogonies: that of Riga-Veda, and the more recent of the code of Manu. The first, which is rather obscure, shows us still the Deity immolating itself to give birth to the world.

The code of *Manu* shows us, that the Lord, the supreme and eternal Being, "was self-existent, producing first the waters (*nara*), into which he deposited a seed." This seed became an egg, brilliant like gold, also sparkling like a star of a thousand rays, and in which the supreme Being himself was born under the form of Brahma, the

ancestor of all the beings. "Hence the name NARAYANA, the one who moves upon the waters," given to the new being. After having dwelled in this egg one Brahmanic year (that is, 3,110,400,000,000 years like ours), the Lord divided this egg into two parts, of which he made heaven and earth, separated by the atmosphere, "the eight heavenly regions and the permanent reservoir for the waters." Then from his mouth, his arm, his thigh, and his foot he drew forth the diverse castes, commencing with the Brahmans. His body, divided into two parts, became half male and half female, and gave birth to a whole hierarchy of beings, in which the spirit loses itself. They are, according to Manu, ten eminent saints called *maharchis*; then the gnomes, the giants, the vampires, the nymphs, the Titans, etc. In the *Egyptian* cosmogony, still little known, we see the creator Phtah modeling man on a potter's wheel. Among the *Persians* we find the division into six epochs; but these epochs have a duration which varies from forty-five to eighty days. They beheld successively appearing the heavens, the water, the earth, the trees, the animals, and man. There are seven heavens, each of which bears a special name. The bull was created before every other animal and lived alone; but at its death its seed, transported into the lunar heaven, gave rise to the other animals. Man himself drew his body from the right arm of the first bull. In his turn he lived alone, and at his death he was transformed into a tree, which, cut in two, gave birth to a man and a woman, the ancestors of all mankind. We omit numerous details void of all sense or too childish. In *Japan*, we find again the chaos of Genesis, chaos which gave rise to heaven and earth; but the earth is represented as swimming upon the sea like a fish, and above it is shown a flower which becomes a divine spirit. The *Occidental* cosmogonies contain the same mixture of truth and error, of probability and of absurdities. *Greece* furnishes very little on the origin of the world and of man. On the contrary, we find in their cosmogony long and tedious details about the origin of the gods, who for the most owe their birth to a series of evolutions, the one more improbable than the other. However, at the beginning of mankind, Hesiod shows us the golden age, which might be an altered remembrance of the earthly paradise. Among the *Latins* we find, as in the Bible, chaos, *rudis indigestaque moles* (Ovidius), at the beginning of the things. Then all the elements are confounded—air, earth, and water. After this they separate themselves, and the

continents appear. In the *Germanic* cosmogony we see an enormous mass of ice springing forth at the North Pole, and by melting gives rise to the chaos. From this chaos God caused to arise the cow Audumbla, which, in licking the ice to find some nourishment therein, forms thereof the osseous frame of the giant Bur, father of Bor and grandfather of Odin. Then from the primitive chaos there are formed nine spheres, which represent the entire universe and its inhabitants—gods, men, giants, gnomes, etc.

Incomplete as it may be, this short review is sufficient to give an idea of the extravagance of the pagan cosmogonies, and to show that they cannot enter into comparison with the simple, sublime, and rational cosmogony which figures at the head of our Sacred Books. "Compare the biblical account with these fables," said Mgr. Meignan, "and you will admire how the former bears in all its parts the imprint of historic truth. The entire account is sober, plain, clear, and conformable to reason. Undoubtedly the history of Genesis breathes the highest poetry; it has magnificent traits, sublime words; but we discover therein neither any philosophical system, nor any poetic fancy, no obscure myth or childish fables. To this recital, so grand and so simple, we have to reduce all the exaggerations of the other cosmogonies."

III. THE SCIENTIFIC COSMOGONY.—Before passing to the critical study of the biblical cosmogony, it is necessary to briefly notice what science teaches us on the same subject. The history of our globe may be divided into two plainly distinct parts, the one anterior, the other posterior, to the appearance of life. The first, eminently conjectural, because it escapes the direct observation, is connected with the astronomical and physical sciences; the second, more precise and better known, belongs to the domain of geology. Let us throw a rapid glance on both.

1. *Cosmic Era*.—According to a theory generally admitted and which everything confirms, the earth and the other planets and satellites which form a part of the solar system were primitively in the gaseous state, and in this state constituted an immense sphere, of a radius at least equal to the distance of the sun from Neptune, the most remote planet. This gaseous sphere, which they have called the *primitive nebula*, was endowed with a rotary movement which by and by became accelerated as a result of the condensation. The centrifugal force developing itself in proportion,

gaseous particles, perhaps even complete rings, detached themselves from the surface of the immense sphere, at its equatorial part, and by concentrating themselves gave rise to the planets, which, themselves still gaseous, begot the satellites in the same manner. The nucleus of the nebula, not yet entirely condensed, is nothing else but the sun, whose mass is seven hundred times above that of all the planets united with their satellites. This hypothesis, to which Herschel and Laplace have attached their names, rests upon numerous facts. It is observed, for instance, that the density of matter increases upon our planet from the surface to the center, and undoubtedly also from the most remote planets to the sun itself, which is probably still in a gaseous state. In the second place, the different phases through which our nebula must have passed are again found in our days in our solar system, or in the extraneous systems. The telescope here shows us nebulae which seem in the way of condensing themselves; there, suns on the point of extinguishing themselves in order to become planets; elsewhere, planets or satellites, like the moon, that have attained, it would seem, the extreme point of their transformations and become uninhabitable in default of atmosphere. A last argument appealed to in confirmation of this system consists in the uniformity of the rotary and revolutionary movements of the planets and of their satellites, all of which or nearly all are direct, that is, executed from west to east. We say almost all, for it is believed to have been established within the last few years that the movements of the satellites of the two most remote planets, Uranus and Neptune, are effected from east to west; but this exception, if it is real, does not, whatever may be said, run counter to the system attributed to Laplace. It is rather a quite natural consequence of the law of Kepler, who claims that the celestial bodies most remote from the star around which they gravitate have an inverse swiftness from their distance. But here is not the place to insist on a question of such a technical nature. In spite of the criticisms to which it might have been exposed, the theory which beholds in the heavenly bodies so many fragments more or less condensed of an ancient nebula is universally accepted by the learned world, and although it may not be susceptible of a direct demonstration, and may be variously understood in the details, it is a very difficult thing to prove it lacking in a foundation of truth.

But the matter of which the universe is composed could not pass abruptly from the gaseous into the solid state. In the interval there was a liquid or doughy state, which must have served as transitional. The molecules drawn together through the effect of condensation, which itself resulted from the law of attraction, combined themselves in such a manner so as to form solid bodies, and in combining themselves they must have produced heat and light. Nevertheless, the principal source of heat has been the condensation itself of the nebula, condensation which, by continuing before our eyes in the sun, makes of this central astral sphere the radiant heat-giver which sustains life upon our planet.

Much smaller than the sun, the earth necessarily passed more quickly through the diverse phases through which it seems every heavenly body is called upon to pass. Like its satellite, the moon, which had become detached from its still gaseous mass, our globe needed only a relatively short time to transform itself from a simple nebula into a luminous sun, and from a sun into a cooled planet, capable of being inhabited. To the gaseous state, as we have said, succeeded the liquid state, to the latter the solid state. In consequence of the perpetual radiation that was produced on its surface, the superficial layer became solidified first, so as to form a thin crust similar to that which covers the currents of lava after a volcanic eruption. Often broken at the beginning, on account of its thinness and of the violence of the internal fire, this crust ended by reconstituting, consolidating, and cooling itself, so as to permit vegetable and animal life to develop on its surface. Then commences the *geological era*, which we have to describe briefly.

2. *Geological Era*.*—This era has been divided into three long epochs, called *Primary* (or epoch of *Transition*), *Secondary*, and *Tertiary*. Very often geologists add a fourth epoch, of which the actual age is only the extension of the Tertiary, called the *Quaternary* epoch; but on account of its short duration, confusion, and absence of precise characters, the latter epoch cannot, by common consent, enter into comparison with the foregoing ones. The characteristics of the geological epochs are as follows: The first has been the era of the vegetables; the second the era of the aquatic animals, especially of the reptiles; the third the era of the terrestrial animals, and the fourth the human era. But without making here a course of geology, we have to enter somewhat more into details.

* For the better understanding we here summarize and give fuller details to the First Preliminary Chapter.

a. The *Primary* epoch is also called, as we have said, Period of *Transition*, because the grounds which represent it mark it as a passage between the rocks of fiery origin, which constitute the mass of the earthly crust, and the sedimentary rocks, deposited at the bottom of the waters and often enriched with fossil remains of plants and animals. It is divided into five periods, which correspond to the successive formation of the *Cambrian*, *Silurian*, *Devonian*, *Carboniferous*, and *Permian* strata. Life seems to have appeared upon earth at the beginning of the *Cambrian* period, under the form of the lowest beings,—annelides, polyps, graptolithes, etc.,—belonging to the lowest steps of the animal ladder. It developed itself in the period following; but it is still represented only by beings of small structure, mostly aquatic, the continents having yet hardly made their appearance. That which dominates in this humble fauna is a family of crustacea called *trilobites*, on account of the three lobes that characterize them and distinguish them from the other existing beings. However, in the upper part of the *Silurian* stratum fishes appear; but they are scarce and of slight dimension. The *Carboniferous* period, which follows, is the most important of the *primary* school. On the recently emerged continents, thanks to the humidity, the still intense and uniform heat, and the carbonic acid abundantly spread over the impure atmosphere of the first times, there develops a luxuriant vegetation, whose débris, carried along by the waters into the estuaries and lakes, gave rise to immense deposits of coal, which foster modern industry. When later on it was represented by plants of a more elevated order, at no time in the history of the globe has it been so abundant. This wonderful vegetation continues, whilst becoming weaker, during the *Permian* period, which is, so to say, only a prolongation of the preceding, although it had its characteristics in certain mollusks which then made their appearance.

b. Four times less extended than the *Primary* period, when we judge it by the thickness of the strata which are connected with it, the *Secondary* epoch, divided in its turn into three periods, *Triassic*, *Jurassic*, and *Cretaceous*, has been essentially that of reptiles, and especially of aquatic reptiles. Undoubtedly, the mollusks are always the most numerous in it, as, witness the *ammonites* and *belemnites*, which occupy such a large place in the glass cases

of our paleontological collections; but the cold-blooded vertebræ, the fishes and the reptiles, attract still more the attention on account of their strange forms or their imposing proportions. The reptiles, especially in this period, have dimensions which we no longer find in the existing fauna. Such are the *ichthyosaurus*, the *megalosaurus*, animals more or less amphibious of the Saurian family, which measured thirty feet in length and more. Others, like the *pterodactylus* and the *ramphorhynchus*, had the strange privilege of being provided with wings and with the power of flying, or at least of maintaining themselves in the air for some time. In that time also the birds make their appearance. We can recognize them by the imprints which their feet have left on the strands of the period, and also by their bones, which, however, are very rare. As to the class of fishes, which we have seen making their appearance in the Primary epoch, it maintains and develops itself during the Secondary epoch, especially towards the end, during the deposit of the cretaceous layers, without, however, assuming extraordinary proportions.

c. The *Tertiary* epoch, the third of the geological times, much resembles ours from the point of view of the fauna. It is *par excellence* the era of the earthly animals. All the families of mammifera are represented therein, but none by more gigantic animals than that of the pachyderms. Aside from the *paleotherium* and the *acerotherium*, which seemed to forecast our rhinoceros, and aside from the *hipparion*, whose transformation has made it the ancestor of the horse, we see the *dinothereum* and the mastodon, "the most imposing of the earthly mammifera which have lived upon our globe" (Albert Gaudry). The *dinothereum* attained to fifteen feet in height. The mastodon, which hardly differed from the elephant except by its knobbed dentition, prevailed, however, over the latter through its still more colossal proportions.

d. Finally, in the superficial strata which represent the *Quaternary* epoch or, if you wish, the beginnings of the actual era, we find the real elephant, the mammoth, and, aside from this, the predecessors of our actual species, the rhinoceros, the bear, the stag, the horse, etc., and finally man himself, our ancestor, whom we recognize by the rude implements of stone which he fashioned, more than by his bones, which are almost always of a doubtful authenticity.

Such are, in summary, the diverse manifestations of life on the surface of the globe. In the *primary* times, there were neither mammifera nor birds, but low mollusks, crustaceæ (tribolites), some fishes, the first batrachians, and especially a luxuriant vegetation which gave us our immense layers of coal. Favored by a warm and cloudy atmosphere, which is not without analogy to that of our tropical regions, this vegetation resulted in purifying the air, from which it removed the excess of carbonic acid and perhaps the other impurities which until then undoubtedly had been an obstacle to the direct action of the solar rays. Henceforth, terrestrial air-breathing and pulmonary animals will be enabled to live upon the earth. They also make their appearance in the Secondary epoch, first under the form of more or less amphibious reptiles, for undoubtedly the continents are as yet little extended and the air has not acquired its definitive purity. Only towards the end of the Secondary period the birds appear, whose energetic respiration requires an air rich in oxygen, and some of the lower mammifera. Thanks to these same conditions, the great terrestrial animals arrive in their turn to animate nature, henceforth ready to receive man himself, the last arrival of the created beings. This is the Tertiary epoch, of which the present times are, so to speak, only the continuation.

IV. ACCORD BETWEEN SCIENCE AND THE BIBLE.—If one will now go back to the first chapter of Genesis, which we have given at the head of this chapter, he will find there, instead of a pretended discord, a striking resemblance to the preceding cosmogony. To convince ourselves of this, let us examine successively each of the Genetical days.

Creation of Matter.—The creation of matter preceded every other intervention of the Deity in the production of the visible world; science requires this not less than logic. Science proves, indeed, that matter cannot be eternal. By teaching us that it took successive forms in an uninterrupted progress from one to another, passing from the simple and gaseous state into the composite and solid state, it shows it to us at the beginning in a state of the greatest simplicity. It is impossible to go back further than to the beginning of the evolutionary period. At this point of the past, which, although extremely remote, cannot have been infinite, creation asserts itself. It is the moment when God launched the

material atoms into space, subjecting them to laws which have formed of them our actual world. The expressions, of which the sacred writer makes use, seem to indicate that he had an idea about the state of matter at its going forth from the hands of the Creator conformable to that of contemporary science. *The earth*, he tells us, *was unformed and empty* (Gen. i. 2). "Invisible and without consistency," says the Septuagint. These words may be applied to the primitive nebula, whose elements were so rarefied that it was inferior in density, they tell us, to the air that remains in the pneumatic machine after the attempt at a vacuum.

First Day.—It was marked by the appearance of light. Thus it preceded the light of the sun by three days. This fact, far from being in contradiction with science, denotes, on the contrary, in the sacred writer an extraordinary intuition, which can hardly be explained without a special revelation. To speak of light before pointing out the existence of the hearth which is to-day the only source thereof, must have appeared paradoxal in times of yore, and an ordinary writer would undoubtedly never have even dreamed of this. It needed the progress of modern science to verify the author of Genesis. We know now that the sun did not need to be the first hearth of light to enlighten the earth.

Geology teaches us that long after life had appeared on the globe under the form of vegetables and the lower animals, at least until the carboniferous period, our planet was surrounded by an opaque atmosphere charged with carbonic acid, gaseous matters, and watery vapors, which an elevated temperature hindered from becoming entirely condensed. In consequence of these perpetual clouds, very favorable to vegetation when joined with heat and dampness, the luminous rays emitted by the stars were intercepted, so to speak, and the earth received only a diffusive light. It was only when the temperature had become somewhat lower, and when the wonderful vegetation of the carboniferous times had absorbed the greater part of the carbon with which the atmosphere was saturated, that the humble inhabitants of the earth could see the solar disk and the other stars. Hence it is not without reason that the sacred account postpones, until this date, posterior to the great vegetable manifestation of the *third day* or of the carboniferous period, the appearance of the sun, moon, and stars. For, we must

not forget, the sacred writer does not tell us that these heavenly bodies were *created* on this day. The word *bârâ*, whose signification we have studied before, is used by him only in rare circumstances and always with a deliberate intention, for instance, for the first appearance of matter. The word here used, *âsâh*, has evidently not the same force. It signifies at most *to make*, and we have no right to exaggerate or alter its meaning. Let us conclude from what precedes, on the one hand, that the sun was not the first hearth of light that illumined the earth; on the other hand, that its disk became visible only quite late, undoubtedly long after it had fulfilled already its actual rôle, a double reason why the sacred writer could, even had to, in spite of the sneers of the last century, mention its appearance long after that of the light.

Second Day.—The *first day*, joining with it the period that preceded the appearance of light, must have been of immense duration. We can consider this epoch as extending from the very creation of the elements of matter until the time when the earthly crust commenced to form itself. Therefore, it comprises the whole time during which the earth remained in the gaseous state. As to the *second day*, it extended from the formation of the solid crust to the emersion or appearance of the continents, and will comprise not only the *Azoic* age of the geologists, but also at least the whole *Cambrian* period, the first of the geological eras; for there is every reason to believe that the continents did not yet exist in this period. At least the animal and vegetable kingdoms have not furnished to us until now any distinctly *terrestrial* fossil that dates from these remote times. We can even, it seems, say the same of the first part of the Silurian period.

Be this as it may, on the *second day*, the Bible tells us, the waters that were above separated themselves from those that were below. What does this mean, if not that the water, maintained until now in the vaporous state through the intense heat which radiated from the globe, not yet solidified, then became partly condensed? All this is conformable to the accounts of science. At the same time that the earthly crust became thicker and cooler, the vaporous water evidently must have become condensed, and by condensing have formed round the globe a continuous liquid mass; for if there are here and there inequalities of the soil, as are to be met with in the

cooled volcanic lavas, there are not yet unevennesses which might merit the name of mountains. However, the temperature is always very high, because a part of the vapors remains yet a long time in the state of clouds high in the heavens. This is really the *separation* of the waters from the waters, of which the sacred writer speaks; it is the formation of the atmosphere or of the *firmament*, to use the expression consecrated by the Vulgate. However, the waters become cooler by and by and permit the development of life at the bottom of the seas under the most humble forms. This is the beginning of the *Primary Epoch*. If the Bible does not tell us anything of its first beings, it is because, buried in the depth of the waters, they have played in the history of the globe a rôle which may interest science, but not man generally speaking.

Third Day.—Until now the waters covered the entire face of the earth, still destitute of sensible life. But behold the mountains and plateaus rising and permitting life, until now relegated to the bottom of the seas, to develop itself upon the firm earth. The earthly crust has become thicker. In order to continue to rest on the liquid nucleus, which has diminished in volume, it bends itself, and these bendings form the mountains. This appearance of the continents inaugurates the third part of the creative work. Upon these freshly emerged lands develops, thanks to the dampness, heat, and atmosphere always saturated with carbon and watery vapors, the luxuriant vegetation which characterizes the carboniferous period. Here again everything is rational and conformable to the teachings of science. The dominant trait of the *Primary* epoch, like that of the third genetical *day*, is, after the formation of the continents, the development of the vegetation, which never in any other epoch attained a similar exuberance. If the sacred writer really intended to seize the characteristics of each of the *days* of the creation, to note down in a few words, that which would have especially struck every spectator that had assisted at the slow formation of the world, it would have been about the plants, and about the plants alone, he should have entertained us, after having pointed out the emersion of the first continents. Undoubtedly, it was not the vegetable life alone that existed in this period. Animals of an inferior order, mollusks, crustacea, even some vertebrates of the class of fishes, lived concurrently; but, buried at the bottom of the waters, these

beings passed in some way unperceived in the midst of the abundant carboniferous vegetation. Hence it is that some exegetists have wrongfully appealed to this silence of the inspired author in order to refuse to identify the carboniferous period with the third *day* of the creation. Their objection would perhaps have some value, if Moses attributed the appearance of the fishes to another period; but he does not do this. He does not even mention them on the fifth *day*. The aquatic animals which he points out at this date are not fishes, but marine monsters and reptiles of whimsical and imposing forms. A new proof that the inspired writer contents himself with pointing out at each epoch that which constitutes for the mass of men the striking and characteristic feature. Now, that which constitutes for everybody, even for the learned, the characteristic feature of the Primary epoch, is evidently its vegetation. In view of the mighty spectacle it presents, the humble fishes that were swimming in the seas of that period could be overlooked.

Fourth Day.—The event referred to at this date by the sacred writer, namely, the appearance of the sun, moon, and stars, does not belong to the domain of geology and almost escapes scientific researches altogether. However, it is conformable to the accounts of science. It is quite natural, indeed, that the air purified through the abundant vegetation of the foregoing period, permitted the luminous rays emanating from the heavenly bodies to reach our planet for the first time. Hence it is no longer only a diffusive light which the earth receives; henceforth the sun, moon, and stars will be visible, at least at intervals. It is undoubtedly in this sense rather than, as we have said, in the sense of a real creation, that we must understand the sacred text. It would be contrary to the scientific probabilities that all the heavenly bodies should have been created at the same time and in this late period. Also, as we have seen before, Genesis does not speak here at all of a *creation*. The word *bārâ*, "to create," which has thus far been employed only once, in regard to the first appearance of matter, will not be employed any more except in regard to animals and man; which is also conformable to the requirements of sound philosophy.

The fourth genetical *day* cannot have had such a considerable duration as the preceding ones. We can place it geologically only

between the *Carboniferous* period and the *Secondary* epoch, the former of which clearly corresponds to the third biblical *day*, and the latter to the fifth. In fact, the single event to which it is devoted, the appearance of the astral bodies, must have been almost instantaneous; a rent produced in the thick clouds, that veiled the heavens, was sufficient to reveal to the earthly beings, yet of so inferior type, the celestial wonders. However, a considerable time must have elapsed before this spectacle, at first exceptional and very rare, was offered almost constantly to the earth, and this time, which constitutes the fourth day, may be identified with the *Permian* period, the last of the *Primary* epoch. The carboniferous vegetation which then continued, it is true, but with less exuberance, must have resulted in completing the purification of the atmosphere and preparing for the arrival of pulmonary-breathing animals.

Fifth Day.—The work of this *day* is a double one; it consists in the successive creation of the aquatic reptiles and of the birds. It is something remarkable that the *Secondary* period of geology presents to us the same animals in the same order. Since the *Triassic* period, which constitutes the first part thereof, we see appearing various reptiles of the class of the swimming saurians. However, the most monstrous of these reptiles, such as the *ichthyosaurus*, for instance, appear only later, in the *Jurassic* epoch. As to the birds, one has found but little of their remains or imprints, except, in the *Cretaceous* layers—that is, on the upper part of the secondary strata. It is true they are not very numerous therein, but they are not any more so in the periods following. This comparative rarity is due undoubtedly to the tenderness of their bones, which could hardly resist the destructive action of time. It is due also, according to Pictet, to their specific weight, which, inferior to that of water, prevented them from becoming fossilized, as it caused them to float on the surface in cases of inundation, and thus become a prey to the voracity of fishes and of other carnivorous animals. Besides it is well to remark that the Hebrew word *ôf*, employed here, and generally translated by “bird,” has not, however, this sense exclusively; it also signifies “flying being,” and consequently may be applied to winged reptiles, such as the *pterodactylus* and the *ramphorhynchus*, as well as to birds, properly speaking.

The same remark applies still more rigorously to the fishes, whose creation it is customary to refer to the fifth *day*. In reality, there is no question of fishes at this date, but only of marine monsters and of animals which crawl in the water. Moreover, the geological epoch called *Secondary* is remarkable, not only for its fishes, but for its marine monsters and aquatic reptiles; so that they have called this period "the age of reptiles." But one thing to which sufficient attention has not until now been paid, is that these reptiles are all, or nearly all, aquatic. Of the various orders which compose this class, a single one only, that of the *ophidians* (serpents), has almost exclusively earthly habits; besides, it is not represented in the *Secondary* epoch, whilst the others are abounding in the strata of this age.

It seems, then, that all the secondary reptiles frequented the seas, lakes, or rivers: which is in conformity with the biblical account, which makes the fifth *day* the era of the aquatic animals. Let us remark, however, that if one should succeed in establishing among these reptiles some land species, the veracity of the sacred writer would not suffer on this account. It would always remain true that the marine monsters and the aquatic reptiles have constituted, before and with the birds, the striking feature of the fifth *day*, and it would be poor grace for us to require from a writer, who devotes his pen to great outlines, to point out such very small exceptions.

Sixth Day.—The sixth and last part of the creative work undoubtedly corresponds to the *Tertiary* epoch of the geologists. According to both the Bible and science, this epoch is preëminently the age of the earthly animals. Certainly among the *mammifera*, then so numerous, there existed some species which, like our present cetacea, lived in the sea; but, except the group of aquatic animals, which appeared in the preceding period, they are relatively scarce, especially when we consider the facility with which their remains ought to have been preserved at the bottom of the waters. That which dominates in the *Tertiary* fauna, are before all the pachyderms and the ruminants. These have given to this period its peculiar physiognomy, and it was quite natural for a writer, who neglects the details and has no scientific pretension, to concentrate his attention upon them. We will not take the trouble to enumerate them. To have an idea of their importance

and of their variety, it is enough to throw a glance on any geological treatise.

But a still more important work is attributed to the sixth *day*: Man is created. Here there is question of a real *creation*. The expression used is the word *bárá*, which signifies "to draw out from nothing," and which we have met only twice: first in regard to the appearance of matter, and the second time at the creation of the first animal; a double circumstance where sound reason, resting upon science, claims, indeed, the creative intervention of God.

A little difficulty presents itself as to the subject of the identification of the sixth Genetical *day* with the *Tertiary* epoch. The Bible refers the creation of man to the sixth *day*, whilst geology shows us man only in the *Quaternary* epoch. We might answer that certain scientists have pretended to find in the Tertiary layers manifest proofs of the existence of our species; but their opinion is to-day almost unanimously rejected, as we shall see in another place. It will be sufficient for us to remark, in answer to this objection, that the *Quaternary* epoch has been separated arbitrarily, and without sufficient reason, from the preceding period. It is so little distinct from it, and has such weak titles to be placed upon the same footing as the great geological epochs, that the English scientists have made of it a simple appendant of the *Pliocene* period, the last of the Tertiary times, and for this reason have called it *Postpliocene*.

The very remarkable accord which we find established between the biblical cosmogony and the teaching of science has struck, as we have said already, many learned investigators. The chronological sequel of the events is exactly the same in both, says Pfaff, in his *Schoepfungsgeschichte*: "The primitive chaos; the earth covered first by the waters, afterwards emerging; the formation of the inorganic kingdom followed by the vegetable kingdom, then by the animal kingdom, which has for first representatives the animals living in the water, and after them the earthly animals; man appearing the last of all: such is, indeed, the real succession of the beings; such are, indeed, the diverse periods of the history of the creation, periods designated under the name of days." In face of a similar accord one is tempted to cry out with Ampère: "Either Moses had a scientific knowledge as profound as that of our century, or he was inspired."

The table below sums up what we have just said on the manner in which we understand the identification of the two cosmogonies, the scientific and biblical:—

AGREEMENT OF THE TWO COSMOGONIES

1ST SCIENTIFIC		2d Biblical	Common Characters
Epochs	Periods		
COSMIC.....	<i>Id.</i>	First day..	Creation of matter in the gaseous state. Appearance of light.
AZOIC.....	<i>Id.</i>	Second day..	
PRIMARY.....	Cambrian	Third day..	Transformation of a part of the watery vapors that surround the whole earth; formation of the atmosphere.
	Silurian } Lower... } Higher...		
	Denovian.....	Fourth day..	Emergence of the continents. Kingdom of plants.
	Carboniferous.....		
SECONDARY ..	Permian	Fifth day..	Appearance of the celestial bodies.
	Triassic		
	Jurassic		
TERTIARY....	Cretaceous	Sixth day..	Kingdom of marine monsters, aquatic reptiles, and birds.
	Eocene		
	Miocene		
QUATERNARY.	Pliocene		Kingdom of the earthly animals. Creation of man.
	Postpliocene.....		

CHAPTER III.

THE HEXÆMERON OR THE GENETIC DAYS.

I. *Outline of the Various Systems of Interpretation of the Genetic Days.*—There are in existence four principal explanations of the days of Genesis. The first is the *literal* explanation. It consists in taking all the words of the sacred text in its literal meaning, and to admit, consequently, that the universe was created within six days of twenty-four hours, each composed of an evening and morning, of a night and a day.*

*This opinion is held by Bosizio, Eirich, Glaire, Veith, and Keil. See the work of the latter, *Genesis*, 1866, p. 15.

The second system is that of the *ideal* explanation, also called allegorical or mystic explanation. It consists in admitting with St. Augustine that God created all things simultaneously, in one single instant, and that the distinction of the works of creation, in the account of Moses, has no other end than to place more easily the cosmogony at the bearing of our intelligence, by presenting it to us, not by one single stroke, but in successive tableaux. God, therefore, did not employ six days to produce the universe, but He brought it forth from nothing in one single instant, by an act of His will; only the account is divided into six days, in a figurative manner, in order thus to classify the principal divine works.

The modern authors who adopt the ideal explanation of St. Augustine modify it in the following manner: Moses does not describe the creation objectively, but subjectively; he does not relate what passed indeed, exteriorly, in the production of the universe, but what passed within himself, interiorly, when God manifested to him His works in a series of visions. The distinction of the days is nothing else than the distinction of the visions. God, to make known to His prophet His creative power, made him see in six visions, which might have taken place in six different days, the six tableaux which the sacred author has described in the first chapter of Genesis.*

The third system is that of *Intervals*; they call it also theory of *restitution* or of *restauration*. It consists in supposing that a space of indefinite time elapsed between the act of creation, properly speaking, and the six days described by Moses. During these six days, God *restored* or re-established the creation. By the first creative act, the earth was rendered fit to serve as a dwelling place for the organized beings, a long time before the

*This opinion is shared by Michelis, *Natur und Offenbarung*, Münster, April, 1855; Kurtz, *Bibel und Astronomie*, Berlin, 1849, p. 21; Baltzer, *Biblische Schöpfungsgeschichte*, Leipzig, 1867; Faye, *Sur l'origine du monde*, 2d edit., Paris, 1885; Mgr. Clifford, bishop of Clifton, in England, *Dublin Review*, April, 1883; Theodore Zollmann, German of New York, *Bibel und Natur*, 1869, has carried the prize proposed by an association of orthodox Protestants to the one who would best solve the question of the accord of the Bible with science; he believes that Genesis exposes the plan that existed in God's mind, not in the manner He realized it.

beginning of the genetic days. During this *interval* and this indefinite period were living and dying those plants and animals which we find to-day in a fossil state in the earthly strata. This earth with its inhabitants and productions was destroyed by a catastrophe in which we can see, if we wish, an allusion, in the words: "The earth was void and empty" (Gen. i. 2), *i. e.*, in a state of chaos. The state of chaos indicated by this verse can hardly be applied to the divine work, such as it went forth from the hands of the Creator; it presupposes a revolution, having brought on the destruction previous to an order of things, and must be considered as the starting point of a new creation, which interests us more directly, because it should end by the creation of our first father.

The fourth system is that of the *epochal-days*, or period-days, so called because it considers each of the six days of creation as signifying an epoch of an indetermined length, not a duration of twenty-four hours. They call it also *concordistic* system, because it admits a complete *concord* or accord between Genesis and science, in opposition to the other theories, called *non-concordistic* theories, which deny this accord between geology and the Mosaic account. The followers of the epochal-days understand, therefore, by the genetic days long periods, during which the world progressively organized itself and conformably to the physical laws given to matter by the Creator. In virtue of these laws, the earth became gradually apt to be the seat of organic life; when it is sufficiently prepared, God produces, by His immediate action, the plants and the animals. Then the latter develop themselves, rise and die, according to the laws of nature. Man appears the last upon earth, created immediately by the hand of God. The theory of the epochal-days was first exposed by Cuvier in 1821.

II. *Criticism of the Various Systems of Interpretation of the Genetic Days.*—Of the four systems we summarily exposed above, the first does not seem to be maintainable. Although ordinarily we ought to adhere to the proper sense of the words of Holy Scripture, it is certain that we must understand them in a figurative and metaphorical sense, if these words, taken in their proper acceptation, would express an error. Now, this is here the case, because geology and paleontology prove in an

unquestionable manner that the world, in its actual state, has not been produced within one week, but that there elapsed many centuries before the animals living to-day and man appeared on the scene of the world.

The first chapter of Genesis abounds, as we have seen before, in metaphorical expressions and in images of all kinds; consequently, it must be explained as such. All the exegetists without exception, even the adherents to the literal explanation, are forced to admit a great number of figured expressions in the Mosaic account. It is admitted by everybody that it is by metaphor that God is represented to us as *expressing words*, *seeing* what He made is good, *calling* the light day, and the darkness, night. Science proves that the word *yôm*, day, is also employed in a metaphorical sense. Certainly it does not designate, before the fourth day, the ordinary succession of day and night, because the sun did not shine yet in the horizon; therefore, then it was taken in a figurative sense; it was this also in the latter part of the account. With our habits of speaking it might appear strange that the inspired writer would make use of the word day to point out an indetermined period, and nevertheless we employ it often in an analogous manner, although our languages, which thus make use of the word day to point out an indetermined duration, are rich in expressions of this kind: duration, epoch, period, etc. In Hebrew, on the contrary, there exists only the word *yôm*, "day" to indicate a time of indeterminate duration, like that which we understand by the words epoch or period.

What proves that *yôm* here designates an epoch, is that the earth contains in its bosom numberless remains of plants and animals and that the geological strata are immense cemeteries where the dead are heaped up by myriads:

"The Earth has gathered to her breast again,
And yet again, the millions that were born
Of her unnumbered, unremembered tribes."

Now, it is impossible to preserve to *yôm* the sense of day of twenty-four hours, except in supposing that God created all these numberless débris of plants and animals in the fossil state; but such a hypothesis cannot be accepted by anybody who has

studied geology.* The sedimentary grounds have a thickness of several miles.† Hence we would have to admit that these so thick layers, which have the appearance of deposits, do not exist. Also we would have to admit that milliards of vegetables and animals which are imbedded therein have been created in a dead state; that entire species and kinds, like the tribolites,‡ which characterize the primary grounds and disappear in the secondary grounds, like the ammonites,§ which characterize the secondary grounds and appear no longer in the Tertiaries, have never lived; that the fossil plants of the coal-measure, like the numberless shells which form the cretaceous ground, like the nummulites || of the Tertiary ground, like the débris of crinoidea,** which form the limestone, etc., are pure *lusus naturæ*—mere freaks of nature.

For what motive should God have imprinted into the coal-measures, like a sea attesting their origin, the false imprint of roots, leaves, fruits, which should never have belonged to a vegetable? For what motive should He have created the appearance

* We are not permitted to suppose that all these fossils were deposited in the earthly layers since the creation of man: 1. Because then we would have to give to man a much higher antiquity; 2. Because in the most ancient strata, there is nowhere a human trace, which proves that the animals which have left their remains did live before the creation of man.

† By adding the thicknesses of all the strata of the sedimentary grounds in localities where they are the most complete, if not more developed, we obtain a figure from 105,000 to 120,000 feet.

‡ An ordinary group of articulated animals, which existed in the Paleozoic period, and have been extinct since the close of the carboniferous period. It is conceded by all the naturalists that their nearest representatives are the horse-crabs.

§ Ammonites, so called from their resemblance to a ram's horn. One of the fossil shells of the extensive genus of extinct cephalopodous mollusks (cuttlefishes), of the family *Ammonitidæ*, coiled in a plain spiral, and chambered within, like the shell of the existing nautilus, to which the ammonites were allied.

|| The *nummulites* comprise a great variety of fossil foraminifera, having externally much of the appearance of a piece of money (hence the name), without an apparent opening, and internally a spiral cavity, divided by partitions into numerous chambers, communicating with each other by means of small openings.

** A class of Metazoic animals containing globular or cup-shaped echinoderms, having normally joined arms, furnished with pinnules, and stalked and fixed during some or all, of their lives; so called from the resemblance of

of shell-fragments which should never have been broken, the appearance of parts of skeletons which should never have been separated, the appearance of animals surprised by death at the moment of digestion and still containing the remains of a repast which they should not have taken? *

If we find in the fossil grounds, in the midst of traces rain-drops, the imprints of birds' claws, or of other animals, how can we believe that the beings which have left these traces have never marched nor lived? How can one help not acknowledging that they were, consequently, not created in the fossil state?

Aside of the first system, which is condemned by science, it appears as if the three others could be maintained, according to the preference of each. The system of *intervals* has the merit of preserving to the word day its ordinary signification of duration of twenty-four hours. This determined several exegetists to accept it. However, we believe it not well founded, because the sacred text does not indicate the catastrophe supposed by this explanation between the creation of the first matter and that of the actual world; it has no scientific basis and the results of the paleontological inquiries prove that the actual world was not created within six days, but developed itself slowly and for a long time. An eminent naturalist says:

"The theory of restitution supposes cataclysms, which, in different epochs, and especially before the creation described in Genesis, would have annihilated entire life upon earth and would have established a line of a clearly cut demarcation between the beings previously created and those which came afterwards to inhabit the earth. Now, the most careful study of the grounds and of the fossils

their rayed bodies, borne upon a jointed stem, to a lily or tulip. The body, or calyx, of the ventral surface is directed upward; the stalk is attached to the aboral, dorsal, or inferior surface, which is provided with plates; and the ambulacral appendages have the form of tentacles situated in the ambulacral grooves of the calyx and of the segmented arms. The class is divided into three orders: the *Blastoideæ*, which are without arms; the *Cystoideæ*, which are globular, and have arms; and the *Crinoideæ*, which are cup-shaped, and provided with arms. All the representatives of the first two orders are extinct. The fossil forms are known as the *stone-lilies* and *encrinites*.

*"They have found in the stomach of the ichthysaurus the scales of fishes of which they nourished themselves." (Lavaud de Lestrade, *Accord de la science avec le premier chapitre de la Genèse*, Paris, 1885, pp. 25, 26.)

which they contain shows that these revolutions, which it was formerly believed that they could be admitted, have not existed; that between the flora and fauna of a geological period and the flora and fauna of the succeeding period, there has not been a solution of continuity. The species of one epoch encroach on the following epoch and *vice versâ*. Among the mollusks which actually live in our seas, and even among the mammifera contemporary with man, there are several of them which have lived many centuries, and perhaps even thousands of years, before his appearance upon earth. Therefore, we cannot suppose that these animals have been created only a few days before the creation of man." (Lavaud de Lestrade, *Accord de la science*, p. 30.)

As to the *Ideal theory*, it pleases many, because it cuts short all difficulty in the reconciliation of the Mosaic account with the accounts of science. If Moses did not really describe in what manner the universe was organized and developed itself, but traced only an imaginary tableau, there are neither contradictions nor approachments possible between his poetic description and the scientific accounts of the geologists. This system appears to be forced and appears to push too far the figurative explanation of Holy Scripture. However, as it is not proved to be false, one is certainly permitted to embrace it.

For us, we adopt the theory of the *epochal-days*, which continues to regard Chapter i. of Genesis as historical, but in understanding it in the following manner, and in being very careful not to exaggerate the concordistic accounts between the Biblical cosmogony and geology.

"The six days of creation," says H. Reusch (*Bibel und Natur*), "in particular do not imply that there has been, numerically, six geological epochs: God reveals to us the division of the creation into seven periods only because of the analogy which He wished to establish between the divine week of the creation and the week here below. . . . The essential is that the number *seven* is preserved. Certainly we have to admit that the seventh day of the creation is not a day like ours. . . . The important point in this question, is the idea of the week and that of day."

There has been a development, an ascending progression in the divine work. At first the Creator produced the elements of matter, as is stated in the first verse; the elements afterward, by their

diverse combinations, formed the inorganic and mineral matters; then successively appeared the plants and animals, and finally man.

Genesis, not being a scientific treatise, sketches only in great traits the cosmogony; it does not enter into details; consequently, all the attempts which have for end to bring into accord the particular points of the geological discoveries with the sacred account are purely conjectural. The natural sciences show, in the production of the beings, the same ascending gradation as Genesis; this is sufficient for us to affirm that there is accord between them, as was done by a savant of acknowledged competence and of great wisdom, M. Barrande :

“With regard to the creation of the organized beings, the whole account of Genesis reduces itself to establish three great facts, about which it is in perfect harmony with the scientific accounts acquired thus far by geological science. These facts can be formulated as follows: 1. The vegetable life has preceded the animal life in both the seas and upon the earth; 2. The animal life has been at first represented by the animals living in the seas and by the birds; 3. Consequently, the animal life has been developed posteriorly upon earth, and man has appeared only after all the created beings. I. . . . We know that the marine vegetables, known under the name of *fucoids*, have preceded the appearance of the most ancient fauna, called primordial fauna. . . . It is in the schists placed above the fucoid grit, and consequently posterior to the latter, that we meet with the first traces of animals constituting the primordial fauna, principally represented by crustacea of the family of tribolites. In regard to the terrestrial plants, there exists no trace thereof in the rocks of the Silurian system, except perhaps in England, in the so-called tile-stone layers, which border upon its upper limit. . . . According to the facts indicated, the most ancient earthly plants go back to the epoch when the Silurian ground ended in depositing itself. Now the only vertebrate animals known in this epoch consisted in some species of fishes, still very rare. They have discovered no trace of any earthly animals going back to this period. The most ancient of all the animals which breathed the air and the traces of which have been known until at present, have been found in the upper part of the old red sandstone or Devonian ground of Scotland, *i. e.*, above the horizon which is assigned to the Devonian plants of which we spoke. It is a small reptile whose

length does not attain ten centimeters. It is known under the name of *Teleerpeeton elginense*. The facts established until the present day agree, therefore, to show that the vegetation has preceded the appearance of the animals, as well upon the earth as in the sea. As to this point, Genesis is therefore in perfect accord with the discoveries of science.

"We must also consider that the gradation established by Moses in the vegetable kingdom perfectly agrees with the facts observed by science, which acknowledges that the plants presenting the highest organization have appeared much later than the lower types of the vegetable kingdom. Moses, after having enumerated the three principal degrees in the vegetable organization, did not occupy himself to fix exactly the epoch in which each of them made its appearance, either by the effect of a slow transformation of the types primitively created, and in virtue of a law of development which was imposed upon them, or by a direct and repeated action of the Creator. In other words, it seems to have been the wish of Moses to establish only the relative order of the epochs in which God was pleased to create the prototypes of the classes of beings which had already succeeded one another, and which still succeed one another in the series of time. He made abstraction of the history of the development of these beings whose chief successive forms he however enumerates.

"II. The animal life was at first represented by the animals living in the sea and by the birds. In regard to the sea animals, the fact of their existence before that of the earthly animals incontestably goes forth from all the geological observations until this day. . . . The primordial fauna, on the whole globe explored, is almost solely composed of articulate animals of the class of crustacea, constituting the family of the trilobites. The mollusks are hardly represented therein by some lower types of the class of the brachiopoda. The second fauna enriched itself chiefly by the appearance of a great number of the mollusk type, representing almost all the classes of this branch. The third fauna reveals the still more considerable development of mollusks, and distinguishes itself from the two preceding faunas by the appearance of some rare fishes, which are the first representatives of the branch of the vertebrates on the globe. In the Devonian faunas, the fishes in their turn assume a great and rapid development, in harmony

with that of the mollusks. . . . According to these considerations, . . . it is evident that the animal life in the seas has been anterior to the animal life upon earth.

"In regard to the birds, one easily understands that certain kinds must have existed in the most ancient epochs, because they live on fishes, mollusks, and other animals of the sea. However, the most ancient traces known to-day do not go back beyond the Triassic epoch.

"After having exactly fixed the starting point in regard to the marine animals and birds, Moses enumerates in a remarkable manner the principal types of the animals which have peopled the seas, starting with the crawling ones, *i. e.*, the mollusks, unto the fishes and great cetacea. The order followed in this enumeration corresponds perfectly with what we observe in the series of the geological formations. But after these general indications, although sufficient in a book which is not a scientific treatise, Moses does not occupy himself to determine the precise epoch when each of the animal classes made its particular appearance in the seas. . . .

"III. Since it is proved that the animal life was at first represented by the animals living in the sea, and by the birds, it necessarily follows that the animals which inhabit the surface of the earth go back to a less ancient origin. But we have to remark that, after having fixed the relative epoch of their appearance, Moses did not attempt to instruct us about the different epochs when the types of animal life upon earth made their particular appearance. It appears to be very certain that they were not created all at once, but successively, like the animals of the sea, of which we have spoken. Each of the ancient types has disappeared after a more or less long existence, to make room for new types.

"Thus, in summary, the sacred historian appears of having chiefly intended to fix the relative epoch of the appearance of the plants, marine and earthly animals, without entering into any historic detail in regard to the subsequent development, neither of the vegetable kingdom nor of the animal kingdom. This development took place in the course of time, either by a new and repeated action of the Creator Himself or by the effect of the laws originally established by Him in nature, and which He did not judge proper to reveal to us.

"In studying from this point of view the history of the creation of both the vegetable and animal kingdoms given by Moses, we recognize that it is in perfect harmony with that what geology has deducted from the observation of facts, *i. e.*, from the stratigraphical study of the sedimentary rocks and of the organic remains, may they be vegetable or animal, which they contain." (Note geologique de M. Barrande, published in the appendix by M. A. Nicolas, *Etudes philosophiques sur le Christianisme*, 26th edit., 1885, Vol. III., pp. 451-458.)

The concordistic system, therefore, establishes the accord of Genesis with science. Let us remark, however, that, from the above, it goes forth that the Mosaic days are metaphorical days, not only as to their signification, but also as to their number. The figure six in Genesis must not be taken in a rigorous and absolute sense: it does not signify that we must count only six epochs in the series of the productions of the Creator; we must understand it that there were several successive periods of development. This number was chosen only in order to show that the divine week corresponded with the human week, in which six days are given to labor, and the seventh, the Sabbath, is consecrated to rest. Let us remark, moreover, that the Mosaic cosmogony points out only the chief traits in the work of creation. The details which have less importance in the eyes of the people in general are omitted:

"Hence, three kinds of suppressions: 1. The objects little striking (mollusks, marine plants) are omitted or englobed in the general affirmations. 2. So also the weak beginning, as to the number or importance of objects, of a work which had its full development in one of the following days. Thus, on account of their secondary importance in regard to the great aquatic reptiles, the fishes, properly speaking, are passed over in the third and fourth day, when they were abounding, and named only in a general recapitulation which refers to the fifth day, epoch of the great creation of the marine life. 3. Also, Moses keeps silence about the continuation or the repetition of a work already mentioned under a day, for instance, the continuation of the emersion of the continents, the substitution of one species to another in the same general classification of living beings: thus, although the creation of the actual species did not take place before the

sixth day, one could, however, place the creation of the plants in the third, and that of the marine animals in the fifth." (A. Raingeard, *Notions de géologie*, new edit., Rodez, 1866, p. 264. Cf. Lavaud de Lestrade, *Accord de la science avec le premier chapitre de la Genèse*, p. 53.)

The creation of the plants on the third day gives rise to a particular objection, the sun having been created only on the fourth day. How, they say, could the vegetable kingdom appear upon earth before the creation of the sun, because the vegetables cannot live without its light and heat? The most of the concordists have answered to this difficulty that the sun was not created, in the strict sense of the word, on the fourth day; it was created in the beginning like all the elements of matter, but only on the fourth genetic day this star commenced to illuminate directly the earth with its rays. Before this its diffusive light acted upon our planet and contributed to produce thereon a vegetation of a particular character.

"The terrestrial vegetation during the first phase of its development attests that the sun did not yet exercise any characteristic influence. There were therein neither flowers of any kind, nor leaves falling in winter, nor varieties of floras for the different latitudes. Therefore, in explaining the absence of the effects by the absence of the causes, there were then neither different seasons nor climates; the sun could not be what it is now, because its heat and light were without appreciable action. The soft, pulpy, and uniform vegetation on all points of the globe, was derived entirely from a warm and damp soil and from an air impregnated with carbonic acid; the sun thus far did not exercise its influence." (A. Castelein, *La première page de Moïse*, Louvain, 1884, p. 494.)

The account of Moses contains, therefore, no detail that is not reconcilable with the accounts of science and, in summary, the concordistic system or the system of the epochal-days appears to be the most acceptable; it is, however, like all the other theories, we have exposed, only a system; we must not forget this. Moses especially wished to inculcate the idea of a God Creator and show Him to us preparing gradually the earth to serve as dwelling place for man, in order to set forth its beauty in our regard.

How long did this preparation last? This is a secondary question, whose solution has no theological importance, as we shall see later on, in examining the problems which chronology raises and in refuting

the objections they wished to draw from this head against Holy Scripture. But if the chronology only interests indirectly religion and theology, it is not the same with the creation and origin of things. One of the most ancient and most inveterated errors consists in regarding matter as eternal and to deny or disown the rôle of God in the production of the universe. In our time they make the attempt to revive this old error, under a new form. Hence, the necessity to combat it. It was the purpose of the author of Genesis, from the first words of his book, to establish the truth of creation. Thus he has refuted beforehand the atheists of our days. This is what we are going to show by exposing their system and by establishing that the real science is in accord with the theological teaching of Holy Scripture.

CHAPTER IV.

THE MOSAIC COSMOGONY AND MODERN DISCOVERIES

THE Assyrian documents go back, like the Bible, to the beginning of the world. The Assyrians believed, like the Hebrews, that heaven had been created first, the earth afterwards. When the earth was created, it was at first, Genesis tells us, without form, and void and empty, *tohu va-bohu*. This word *bohu* seems to have been traditional, from all antiquity, in the Semitic race, to depict the primitive chaos, for we find in Assyria a goddess *Bahu*, goddess of the chaos, who must have drawn her origin from the custom, accepted at all times, of characterizing by this word the primitive disorder of the elements. The Hebrews did not lose the remembrance of the true sense of *bohu* which, in their language, always has been only an epithet, expressing a state of disorganization and disorder (Gen. i. 2; Jer. iv. 25; Is. xxxiv. 11); the Assyrians by altering its meaning made a divine personage of it. We sometimes find, however, even in Assyrian, the word *bahu*, in the sense of confusion and chaos.

The primordial abyss, *tehom*, also becomes a deity of the Assyrian mythology, the goddess Tihavti, probably in the same manner as Bahu had become a goddess. This metamorphosis is much more surprising in Chaldea, because the word *tihavti* or *tihamti* was always much used in that country to designate the sea, conformably to its original meaning. In Hebrew, on the contrary, *tehom* was used very rarely and almost exclusively in a poetical way, but it always preserved, and without exception, its true meaning: mass of water.

The details of the Chaldean cosmogony have been preserved to us in a precious fragment of Berosus (who was a priest of Bel at Babylon, and who lived in the time of Alexander the Great), which is confirmed by extant monuments. According to this historian, who had collected the national traditions in the Babylonian libraries, in the first year of the world, there went forth from the Erythrean sea an animal endowed with reason, by name of Oannes, whose body was that of a fish; under the fish's head he had another head, and also feet similar to those of a man, subjoined to the fish's tail. His

voice, too, and language were articulate and human; and a representation of him is preserved even to this day. This being was accustomed to pass the day among men, but took no food at that time; and he gave them an insight into letters and sciences, and arts of every kind. He taught them to construct houses, to found temples, to compile laws, and explained to them the principles of geometrical knowledge. He made them distinguish the seeds of the earth, and showed them how to collect the fruits; in short, he instructed them in every way that could tend to soften their manners and humanize their lives. From that time, nothing material has been added by way of improvement to his instructions. And when the sun had set, this being, Oannes, used to retire again into the sea, and pass the night in the deep, for he was amphibious. After this there appeared other animals like Oannes, of which Berosus proposes to give an account when he comes to the history of the kings. Moreover, Oannes wrote concerning the generation of mankind, of their different ways of life, and of their civil polity; and the following is the purport of what he said:—

“There was a time in which there existed nothing but darkness and an abyss of waters, wherein resided most hideous beings, which were produced of a twofold principle. There appeared men, some of whom were furnished with two wings, others with four, and with two faces. They had one body, but two heads, one that of a man, the other of a woman; they were likewise in their several organs both male and female. Other human figures were to be seen with the legs and horns of a goat; some had horses’ feet, while others united the hind quarters of a horse with the body of a man, resembling in shape the hippocentaurs. Bulls, likewise, were bred there with the heads of men; and dogs with fourfold bodies terminated in their extremities with the tails of fishes; horses also with the heads of dogs; men, too, and other animals, with the heads and bodies of horses and the tails of fishes. In short, there were creatures in which were combined the limbs of every species of animals. In addition to these, fishes, reptiles, serpents, with other monstrous animals, presenting the greatest variety of forms. Of all these are preserved delineations in the temple of Belus at Babylon.

“The person who was supposed to have presided over them was a woman named Omoroka, which in the Chaldean language is Thalathth; which in Greek is interpreted Thalassa, the sea; but

according to the most true interpretation it is equivalent to Selené, the moon. All things being in this situation, Belus came, and cut the woman in two, and of one half of her he formed the earth; and of the other half the heavens, and at the same time destroyed the animals within her (or in the abyss).

"All this," he says, "was an allegorical description of the production of the universe, living beings and liquid matter. The deity above mentioned (Belus) then cut off his own head; upon which the other gods mixed the blood, as it gushed out, with the earth, and from this men were formed. On this account it is that they are gifted with intelligence and partake of divine knowledge. Thus it was that Belus, by whom they signify Hades (Pluto), divided the darkness and separated the heavens from the earth, and reduced the universe to order. But the recently created animals, not being able to bear the prevalence of light, died. Belus upon this, seeing a vast space unoccupied, though by nature fruitful, commanded one of the gods to take off his head, and to mix the blood with the earth, and from thence to form men and animals that should be capable of living in the light and air. Belus formed also the stars, the sun, the moon, and the five planets." (Such, according to Alexander Polyhistor, is the account which Berosus gives in his first book.)

The Assyrio-Chaldaic discoveries confirm the exactitude of this account. Bel-Marduk, the special and tutelary god of the capitol of Chaldea, is often represented on the Babylonian cylinders, such as we have described him; that is, armed with a sword with which he cut in two Belit-Tihavti, the goddess of death and of chaos, called in Greek Omoroka, under which name we find her Assyrian quality of Um-Uruk, or mother of the city of Uruk (Erech), preëminently the city of the dead, the great burial field of ancient Chaldea. The Assyrians seem to have regarded the Ocean as a remainder of the primordial abyss and have made it the sojourn of these strange animals of which their cosmogony speaks.

The written monuments of Chaldea have not yet made known to us such a complete cosmogony as that of Berosus. Until now we possess only mutilated fragments of the Chaldean Genesis, found by George Smith in the library of Ninive, and published by him about the end of the year 1875. However incomplete they may be, they are of very great importance and of much interest.

The Chaldean history of the creation must have been composed, according to G. Smith, of twelve tablets at least, written on both sides, and each containing probably more than one hundred lines of text. It was a good deal more developed than that of our Genesis. The edition which we possess of the fragments is that of the epoch of Assurbanipal, about the year 670 B. C. It breathes throughout the spirit of a later age, its language and style show no traces of an Accadian original, and the colophon at the end implies by its silence that it was not a copy of an older document. The learned English Assyriologist claims that a portion of the cuneiform literature, and particularly the great work on astrology, composed in the country of Accad and containing more than seventy tablets, is anterior to the times of King Urkham or Uruk, who lived two thousand years before Christ. The poem of Izdubar, the work of a poet of southern Chaldea, in which is related, under the form of an episode, the history of the Deluge, should go back at least, according to him, to the year 2000 B. C. The history of the creation and of the fall, originally from the country of Accad, is less ancient; it is placed between 2000 and 1550, that is in the period that elapsed from Abraham to Moses. However, we cannot accept these accounts as very reliable; all these chronological questions are very difficult, and we have no solid foundations upon which to solve them with certainty. All that is certain is, that the traditions preserved by the Assyrian scribes are anterior to Moses, and even to Abraham.

Of the twelve tablets on the origin of things, G. Smith did not find a single one entire. He approximately classified the pieces which he discovered, but without considering all the details of this classification, and without giving the translation of the text as a definitive one. So far as the fragments are arranged, they seem to observe the following order: (1) Part of the first tablet: the chaos and the generation of the gods; (2) another tablet, which we might suppose to be the second: foundation of the abyss; (3) a fragment whose place is very uncertain and referring perhaps to the creation of the earth; (4) fragment of the fifth tablet: creation of the heavenly bodies; (5) fragment of the seventh: creation of the earthly animals; (6) fragments of three tablets on the creation of man; (7) divers fragments concerning the war between the gods and the evil spirits.

The most of the fragments are so mutilated and incomplete that we can reproduce only some of them. The first gives the description of the void or chaos and part of the generation of the gods. The translation is as follows:

1. At that time above, the heaven was unnamed;
2. below the earth by name was unrecorded;
3. the boundless deep also (was) their generator.
4. The chaos of the sea was she who bore the whole of them.
5. Their waters were collected together in one place, and
6. the flowing reed was not gathered, the marsh-plant was
 • not grown.
7. At that time the gods had not been produced, any one of them;
8. by name they had not been called, destiny was not fixed.
9. Were made also the (great) gods,
10. the gods Lakhmu and Lakhamu were produced (the first),
 and
11. to growth they . . .
12. the gods Assur and Kissur were made next.
13. The days were long; a long (time passed), and
14. the gods Anu (Bel and Hea were born of)
15. the gods Assur and (Kissur) . . .

This outset is not wanting of a certain grandeur and it is interesting to compare it with the Mosaic Genesis. In the first place the Chaldean poem appears like a paraphrase, a corrupted amplification and spoiled by mythology, of the second verse of the Bible, so short, but so expressive: "And the earth was void and empty, and darkness was upon the face of the deep. And the spirit of God moved over the waters." There is nothing that corresponds to the first verse of Moses: "In the beginning God created heaven and earth." Of these few words, the basis of all Jewish and Christian theology, expressing two of our principal dogmas, the unity of God and the creation, we discover no trace in the old Chaldean writer. The cuneiform narrative supposes the earth and water already existing; the idea of the creation, of the production *ex nihilo* of the elements of the world, seems there to be ignored, and matter appears therein as being from all eternity.

The doctrine of the unity of God is not found furthermore in the bricks of Assurbanipal. Certainly the belief in one sole God

was the primitive faith of the inhabitants of Chaldea. Assyriology has proved this repeatedly; but the pure doctrine soon became altered. The book of Josue teaches us that the ancestors of Abraham had fallen into idolatry; the most ancient epigraphic monuments of the valley of the Euphrates and Tigris also present to us polytheism already established in Chaldea and a mythology tufted with gods and goddesses.

Hence there are between the sacred narrative and the Chaldean account essential differences. But there are also striking resemblances which point to a common source. Both represent the primitive world as an unformed mass; it is from the chaos, from the abyss, from the water, the primordial matter, that the organized world proceeds. The correspondence exists not only in the thoughts, but extends to the words themselves, for the Assyrian *Tihamat* is found in the Hebrew *tehom*. We read in line 13 that "the days were long; a long time passed" between the birth of the different gods. If an analogous phrase, which is very probable, is found in the other parts of the account, serving to point out the interval which elapsed between the production of the diverse series of the created beings, we would there have a confirmation that the word *Yom* of Genesis designates, not a day of twenty-four hours, but an indeterminate period.

The three succeeding tablets of the creative account have not been recovered. They very probably contain the history of the creation of light, of the atmosphere or firmament, of the firm earth and plants. A short fragment seems to refer to the drying of the earth:—

1. At that time the foundations of the earth (thou didst make);
2. the foundations of the earth thou didst call (them) . . .
3. thou embellishes the heavens . . .

The fifth tablet corresponds to the fourth day of Genesis. It makes known to us the creation of the stars, moon, and sun, destined to serve as signs and to distinguish the seasons, the days, and the years. Like in the whole Assyrian mythology, the moon, or god Uru (Sin), has precedence over the sun, or god Samas. Genesis places the sun before the moon. But the order of the events and periods appears to be the same in the Assyrian poem as in the biblical account:—

1. (Anu) made suitable the mansions of the (seven) great gods.

2. The stars he placed in them, the lumasi he fixed.
 3. He arranged the year according to the bounds that he defined.
 4. For each of the twelve months three stars he fixed.
 5. From the day when the year issues forth unto the close,
 6. he established the mansion of the god Nibir, that they might know their laws (or bonds).
 7. That they might not err or deflect at all,
 8. the mansion of Bel and Hea he established along with himself.
 9. He opened also the great gates in the sides of the world;
 10. the bolts he strengthened on the left hand and on the right.
 11. In its centre also he made a staircase.
 12. The moon-god he caused to beautify the thick night.
 13. He appointed him also to hinder (or balance) the night, that the day may be known,
 14. (saying): Every month, without break, observe thy circle;
 15. at the beginning of the month also, when the night is at its height,
 16. (with) the horns thou announcest that the heaven may be known.
 17. On the seventh day (thy) circle begins to fill,
 18. but open in darkness will remain the half on the right (?).
 19. At that time the sun will be on the horizon of heaven at thy rising.
 20. (They form) determine and make a (circle ?).
 21. (From thence) return and approach the path of the sun.
 22. (Then) will the darkness return; the sun will change.
 23. . . . seek its road.
 24. (Rise and) set, and judge judgment.
- A fragment of the seventh tablet corresponds to the sixth day of the creation:—
1. At that time the gods in their assembly created. . . .
 2. They made suitable the strong monsters. . .
 3. They caused to come living creatures. . . .
 4. Cattle of the field, beasts of the field, and creeping things of the field. . . .
 5. They fixed for the living creatures. . . .
 6. . . . cattle and creeping things of the city they fixed . . .

7. . . . the assembly of the creeping things, the whole which were created.

This division of the animals into three classes is also in Genesis. The fragments which seem to refer to the creation of man are too mutilated and their meaning is too uncertain for us to give here the translation. G. Smith claims to recognize therein a discourse of God to the first man and woman, on their duties: He recommends to them innocence and purity. The man is called *Admi* or *Adami*, the Assyrian form of the Hebrew *Adam*, which, according to Sir H. Rawlinson, designates the "black race" in opposition to *Sarku*, "the light or white race."

Sayce believes that the one whom G. Smith calls "the god Zi" is the first man, the Assyrian equivalent of *Zi* being *Nisu*, the Hebrew *Enos*, "man." According to the same Assyriologist, the first woman would be called *Ahat*, "sister," but all this is very doubtful.

The sanctification of the seventh day of which Genesis speaks was not unknown to the Assyrians, to judge from the Babylonian calendar, such as the cuneiform documents make it known to us. We find traces of the week therein. The seventh day is a day of rest, on which no labor should be performed, whence the name Sabbath, or day of rest, which is given to it in Assyrian as well as in Hebrew. An Assyrian tablet itself explains the word *Sab-batuv* by the words: *ám nuh libbi*, "day of the rest of the heart." A calendar of Saints' days for the month of the intercalary Elul makes the 7th, 14th, 19th, 21st, and 28th days of the lunar month Sabbaths on which no work was allowed to be done. The Accadian words by which the idea of Sabbath is denoted, literally mean, "a day on which work is unlawful," and are interpreted in the bilingual tablets as signifying "a day of peace," or "completion of labors." The calendar lays down the following injunctions to the king for each of these Sabbaths:—

A Sabbath: the prince of many nations.

The flesh of animals and cooked food he may not eat.

The garments of his body he may not change.

White robes he may not put on.

Sacrifice he may not offer. The king may not ride in his chariot.

In royal fashion he may not legislate. A review of the army the general may not hold.

Medicine for his sickness of body he may not apply.

The antiquity of this text is evident not only from the fact that it has been translated from an Accadian original, but also from the word rendered "prince," which literally means "a shepherd," and takes us back to the early times when the Accadian monarchs still remembered that their predecessors had been only shepherd-chieftains.

Before concluding this chapter it must be noted that between the account of the Chaldean tablet, which we have reproduced, and that of Genesis, there exist notable differences and resemblances. It cannot be maintained, however, that Genesis is a copy of the Chaldean poet; Moses has quite a different tone and his words have quite a different meaning. Neither can one pretend that the Assyrian narrative is an extract from Genesis, for the groundwork and form thereof are quite different. Therefore, we have to admit that both the Israelitish and Mesopotamian writers have transmitted to us one and the same tradition, which originally had been held in common, but took diverse shades in passing through distinct channels.

CHAPTER V.

ERRORS ON THE COSMOGONY—DARWINISM—MONISM.

TO THE dogma of the creation *ex nihilo* and to the doctrine of the origin of species produced by an immediate act of God's will, infidel science opposes a new theory, that of *Evolution*. We have seen already in this work and in the preceding ones, that the rationalistic exegetists such as Wellhausen, make use to-day of evolution to rob the Sacred Books of their supernatural character and even deny their authenticity, but this theory above all directly attacks every Christian belief about the origin of the world and the teaching of Scripture concerning the cosmogony; certain savants draw therefrom the most extreme consequences and the most subvertible of all religion; they oppose a sort of an atheistic anti-Genesis to the revealed Genesis and they reject the account of Moses about the creation as a childish fable, which can be believed

only by children. It is therefore indispensable to expose their ideas and to show how false they are, in so far as they contradict Genesis and the dogmas taught by Scripture and the Church.

After having first exposed the consequences which the atheistic followers of evolution pretend to draw from this doctrine, we shall successively examine Darwinism or the system of Darwin who claims to render an account of the evolution of the species, and Monism or the system of Haeckel who renews, under another form, the attempt of Epicurus to do away with God and to explain the existence of the world without Him.

Consequences of Evolution According to Its Most Fervent Followers.—Evolution, such as it is understood by its most fervent followers and in particular by Haeckel, is the greatest effort atheism has ever made to have the appearance of a logical and consequent system. All they had imagined until now to give an account about the origin of the beings was only a chaos of confused hypotheses, incapable of satisfying even those who had invented them. But at the explanations of Haeckel, the infidels cried out with enthusiasm: "*Eureka!* Finally, we have found!" This philosophical stone which the alchemist of the Middle Ages, in spite of all his watchings and experiments, was unable to discover, actual science possesses: it is the Theory of Evolution, which not only operates the transmutation of the metals, but which changes all the beings, which dethrones God and replaces Him. A theory which is sufficient in itself and leaves nothing obscure and unexplained. The atom is God, Darwin and Haeckel are His prophets. The Monism which the German naturalist teaches imposes itself by its simplicity. Everywhere he makes the unity to appear, he seizes with his eagle eye the filiation of all that exists, and the rays which he projects are so brilliant that they enlighten all the eyes like the light of the sun.

The variability of the species, which the English savant establishes, seduces the rationalists and all the enemies of faith, because, it disembarasses them of their greatest scarecrow, the miracle, and furnishes to them the solution for which until now they had hunted in vain. Certainly, they have a profound illusion about the value and solidity of their system; one would be wrong, undoubtedly, to get frightened beyond measure, of the evil which it can do to religion,—religion will live as long as the world,—but,

all exaggeration put aside, it is nevertheless true that Evolution dazzles a great many and in particular fills with enthusiasm those of its followers who did not know before how to get rid of Christianity. It is proper to give thereof first, the proof by showing how important it is to subject the anti-Genesis of Darwin and of Haeckel to an exact criticism.

According to the Evolutionists, Darwin dethrones Moses, the theory of evolution supplants that of the creation, and thereby Christianity itself.

"As long as we had not deeper ideas about the manner God had created the different species in the different geological periods, we could adhere to the expression of a *direct creation*; we, children of modern times, are not at liberty to reject or to admit the theory of descent; we should accept it, because we can no longer make the mystery of the creation to consist in the coarse conception of former times, the knead clay, the divine breath, etc." (Ed. von Hartmann, *Der Darwinismus* p. 24.)

The teachings of the Bible are superannuated, the cosmogony of Genesis has seen its time. All developed itself progressively, without any exterior influence, through its own force. Pliny said that the *convolvulus* was a sketch of nature, exercising itself to form a lily. He believed to speak figuratively; he expressed, in the proper sense, a truth, which in order to be complete needs only to be generalized. All the lower beings are only spontaneously produced sketches, from which have gone forth the superior beings, without the concurrence of a supernatural agent, that does not exist. The Creator is a fabulous personage. Away with the theologians and the *supernaturalists* who still believe in the production of the *ex nihilo*. They are the enemies of science and of progress. Mr. Huxley says:

"The myths of paganism are dead, like Osiris and Zeus, and if one would like to revive them, to oppose them to the actual knowledges, he would be laughed at and despised; but the epoch in which these superstitions flourished, the uncultured inhabitants of Palestine had invented legends that were transmitted to us by writers whose names and period are unknown to us. Unfortunately, these fables have not yet undergone the lot of the first, and even to-day nine-tenths of the civilized world make them the norm and criterion of the value of a scientific conclusion, in all that concerns the origin of things, and in particular in that what concerns the origin of the

species. In the nineteenth century, like in the time when the modern physical science commenced to dawn, the cosmogony of the half-savage Israelite is for the philosopher an incubus, and for the defender of the orthodox doctrines a disgrace. Who can count all those who have sought the truth with patience and in all sincerity since the time of Galilee until our time, and who were filled with bitterness, spit upon, and dishonored by maddened Bible-adorers? . . . Who can count the number of those weaker men who have lost all sentiment for truth, by the very fact of their efforts to bring contradictions into harmony, and who have spent their life in trying to put the new and generous wine of science into the old utricles of Judaism? . . . But if the philosophers have suffered, we have to acknowledge that their cause has been amply revenged. Around the cradle of each of the sciences theologians are hissing, similar to the strangled serpents round the cradle of Hercules, and history proves that every time science and orthodoxy met one another with equal weapons, orthodoxy had to abandon the field, badly used up, if not destroyed, much compromised, if not ruined. Orthodoxy is the Bourbon of the world of thought: it can neither learn nor forget, and, although it is, in the present moment, put out of its reckoning in all its movements, it always pretends that the first chapter of Genesis is the alpha and omega of all legitimate science, and like always it lounges its little thunderbolts at the head of those who do not wish to lower nature to the level of primitive Judaism." (Thomas H. Huxley. *The Natural Sciences* (French translation) pp. 389-391.)

Evolution is, therefore, the revenge of infidelity on the revealed religion. Who is the Hercules that thus crushes the Christian theologians? Who is that avenger of the sufferings of the savants in former times? Who is the one that has freed the human conscience from the cosmogony of the Israelite and from the miracle of the creation? It is Darwin. Strauss wrote in the last work that went forth from his hands:

"Until the contemporary epoch, until Cuvier and Agassiz, science had surrounded the species of the organized beings with insurmountable limits, and had declared as absolutely impossible the passage from one species to a really new and different species. If it was thus, we had to adhere to the creation and the miracle; then, in the beginning, God created the herbs, plants, and trees, and also the

animals, each after its kind (fortunately Darwin appeared and he has explained the origin of the beings). . . . There is no choice between the miracle, the creative hand of God, and the theory of Darwin. . . . To the latter we must go, and will go, there where the pennons joyfully flutter according to the wind. Yes, joyfully, and in the sense of the purest and most noble joys of the mind. We, critical philosophers and theologians, we might well talk and decree the end of the miracle; our sentence remained without echo, because we did not learn to get rid thereof, because we did not know how to show a force in nature that could supplant it in the place where it appeared the most indispensable. Darwin has proved this force, this action of nature; he has opened the gate by which a more fortunate posterity must drive out the miracle forever. Whoever knows what the miracle entails, will hold Darwin equal to the greatest benefactors of mankind." (D. Strauss, *Der alte und der neue Glaube*, 1872.)

Yes, Strauss is right. If the theory of evolution, pushed to its extreme consequences, were true, it would be done with Christianity and the Scriptures; then no more miracle, and all that it entails would disappear; religion is without object, there exists nothing outside the material and visible world; consequently the impious of whom the Psalmist speaks was not deceived when he cried out: "There is no God." Providence is an illusion; all is governed by fatal and necessary laws; there is no other god but matter, no other providence but the indefinite progress, no other moral but private interest. The supernatural, that illusion upon which they pretended to found the religion, vanishes forever at the light of science, like the vampires and bug-bears. Nothing exists outside of nature, and the latter follows a regular and necessary march, without deviation, without exceptions, like the movements of a blind machine. There exist neither prophets nor revealed books, because there exists no Holy Ghost to inspire them. Science replaces the Church, and the theory of evolution dethrones the teaching of the Scriptures. No more heaven, no more hell, no more judge of the living and of the dead. The first French translator of Darwin said:

"The obscure problem of the creation of the living beings is settled, rather than solved, under thousands of forms more or less mystical, in those informal complications of ideas, in turn venerated and despised, adored and cursed, what is called the Vedas, the Zend-Avesta and the Bible. . . . The contrary theory of

evolution is essentially heterodox and irreconcilable, not only with the text of the Old Hebrew Testament, but also with the dogmas they wished to deduct from the Greek Testament. . . . In order that mankind may have sinned in Adam, there must be a collective entity; to be redeemed by the merits of one single person, as to have been cursed by the fault of one single person, there must be, besides the individual life of each being, a specific life, in some sort substantial, well defined, and exactly limited, without genealogical tie with any antecedent species. Now, the theory of Darwin is incompatible with this notion. . . . It would be completely useless to simulate here that the theory of M. Darwin, although it might be very religious, is nevertheless thoroughly and irremediably heretical. . . . This theory contains quite a philosophy of nature and a philosophy of mankind. There was never anything so vast conceived in natural history; one might say that it is the universal synthesis of the economic laws, the social natural science par excellence, the code of the living beings of every race and of every epoch. . . . This revelation of science teaches us more about nature, our origin, and our end than all the sacerdotal philosophisms about original sin. . . . The doctrine of M. Darwin is the rational revelation of progress, assuming an attitude in the logical antagonism with the irrational revelation of the fall. They are two principles, two religions in war. . . . It is a categorical yes or no between which we have to choose, and whoever declares himself for the one is against the other. For me, my choice is made: I believe in progress." (C. Royer, *De l'origine des espèces*, 3d edit., Paris, 1870, preface, pp. xxxv., xxxvi., xxxviii., xxxix., xl., xli.)

It can be seen, if not exclusively, it is at least principally on account of its religious bearing, on account of the abuse one can make thereof, that the theory of evolution owes its unheard success and also its importance. It is hardly more than forty years since Darwinism was brought forward,—the book on *The Origin of Species*, in which Charles Darwin exposed for the first time his system, appeared on Nov. 24, 1859,—and already it counts numerous followers both in Europe and America, it is raised to the height of a new scientific dogma; they proclaim its inventor, not only a benefactor of mankind, but also a new

Copernicus, a new Newton; his book is "The Gospel of Evolution"; the date of its appearance is like a sacred date, worthy of an eternal remembrance (Sir John Lubbock); his system is "the most precious intellectual conquest of enlightened mankind." "With one stroke, he reduces to nothing the dogma of creation, both the mystic and dualistic doctrine of an isolated creation of diverse species." (E. Haeckel.) The discovery of evolution makes of the English and Germans, who invented and perfected it, the teachers and chiefs of mankind. Haeckel assures us of this when he says:

"At the head of civilization are placed to-day the English and Germans, who, by the discovery and development of the theory of evolution, come to lay the bases of a new period of high intellectual culture. The disposition of the mind to accept this theory and the tendency to monistic philosophy which is connected with it furnish the best measure of the degree of intellectual development of man." (*Natürliche Schöpfungsgeschichte*, 7th edit., Berlin, p. 646.)

Darwin is therefore not only a revealer, but he has elevated above all their fellow-men those who have accepted and developed his ideas; he has triumphed over the supernatural, he has annihilated the miracle, he has realized the vow of Voltaire, he has crushed Christianity. Henceforth, "science has nothing to do any more with Christ. . . . For myself, I do not believe that there ever has been any revelation." It is Darwin who speaks thus. (Letter of Darwin to a young man, dated June 5, 1879, and published after his death by Haeckel. See *Revue scientifique*, Dec. 2, 1882, p. 715.) His scientific theories extinguished in his soul the last spark of faith. The evil which he has done to himself, he did to many others. It is this service for which the infidels owe to him the greatest gratitude. "As long as there will be philosophical naturalists," cries out Bois-Reymond, "the most beautiful title of glory of Charles Darwin will be of having diminished, in a certain measure, the torment of the thought that hovered over the world." (*Darwin versus Galiani*, Rede, Berlin, 1876, p. 9.) One of the greatest progresses that has been accomplished in the intellectual domain, is that which we owe to Darwinism, of having substituted everywhere "the blind necessity" in the place of the final causes, *i.e.*, in the place of God. Thanks to Darwin:

"One has already done away with, at least among the philosophical minds, the only ones who count," writes a follower of evolution, "with the old sacristy doctrines of the final causes of the universe, of the unchangeableness of the species, of the geological catastrophes and of the successive creations, of the impossibility of a spontaneous generation and of the youth of man upon earth; . . . in other words, one has done away with the notion of a Creator. The theories of Darwin perfectly give an account to the facts studied by compared anatomy, without that it will henceforth be necessary to transform varieties into changeable species, created once for all; to see in each extinct or living *species* the incarnation of a divine idea or the realization of plans preconceived by, we do not know what strange artist, who, although he applauded himself every time of his work and naïvely found it good, periodically recommended it." (Soury, in his preface of translation of Haeckel's *Natürliche Schöpfungsgeschichte*.)

The final causes, that is, the Creator, are definitively replaced in the organic nature by a very complicated mechanism, but which acts blindly. "The only and unique really scientific form of the thought, are the mathematical physics. The worst of the illusions is to believe of being capable of explaining the finality of organic nature by having recourse to an immaterial intelligence, imagined to our likeness and acting like we in view of certain ends." (Du Bois-Reymond, *Darwin versus Galiani*, pp. 26, 27.) "The doctrine of final causes had all the naïvety of the natural explanations which we find among savages and children. The theories of Lamarck and of Darwin have given the last blow to this decayed doctrine. Modern morphology is irreconcilable, not only with the dogma of creation, but with that of a Providence or of a vague idealistic pantheism after the fashion of Hegel, Schopenhauer, or Hartmann. . . . The phenomena of human embryology are only mechanical and necessary effects of evolution." (E. Haeckel, *Natürliche Schöpfungsgeschichte*, translated by Soury, p. xxiv.)

The materialistic philosophers are naturally in favor of evolution. Alexander Bain, in his *Logique*, calls it a "legitimate hypothesis" and claims that there "exists no rival hypothesis that can be opposed to it." Herbert Spencer has become, in some sort, in England, the philosopher of evolution.

However, Darwinism reduced to its essential elements and such

as it was primitively formulated by its author, does not entail the negation of all religious belief, restrained within certain limits, it could be reconciled with faith. But Haeckel, the father of Monism, charged himself to draw all the consequences from the system; he completes the work which the master had only sketched; he subtilized the poison to render it more mortal and constructed a great war-machine destined to destroy all kinds of faith. "Monism," says Hartmann, the philosopher of the Unconscious, "answers to the religious idea such as the enlightened men of the nineteenth century can conceive it." Mankind has been until now the dupe of the supernatural, that is, of an illusion—monism will deliver it from this. It knew nothing to explain without the intervention of a free and creative being; it will explain all without God and without a Creator. To the creed of the Church, it will substitute a simple and unique law, giving the reason for all that exists and, in particular, of the origin of beings. In the place of the cosmogony of Moses, it will put its own Genesis; thus it will solve the gordian knot of the mystery of the creation which before it nobody could untie.

The evolution of Haeckel is indeed an anti-Genesis, which, on all the points, teaches the reverse of the teachings of the Bible. It sees in the first chapter of the Pentateuch "the most serious obstacle to the general acceptation of the theory of evolution"; hence it follows, somewhat, the sacred account step by step in order to contradict it in all things and to give to it constantly the lie. Behold what Haeckel says:

"If we examine the systems they conceived until now about the creation, they all may be reduced to two: the one affirmative, with the Mosaic Cosmogony, that all the species of the living beings were called into existence, separated, independently one from another, by the will of an all-powerful Creator; the other maintains that all the beings are only the branches of the same stem, the products of a unique and natural law, perpetually acting and always tending toward progress. From each of these systems logically and necessarily flows a whole of conceptions diametrically opposed." (*Gesammelte populäre Vorträge*, 1878, Vol. I., p. 5.)

The personal God, creator of heaven and earth, which the Bible presents for our adoration, is only an imaginary being, an abstraction. "This personal God is simply an idealized organism, endowed with human attributes. This dualistic and so vulgar idea of God

answers to a degree of a lower animal development of the human organism. The actual man, arrived to a high degree of development, can and must form of God, an infinitely more noble and elevated idea, the only one that is compatible with the monistic conception of the world. According to this manner of seeing, we have to acknowledge the spirit and force of God in all the phenomena, without exception. This monistic idea of God, which is that of the future, was already expressed by Giordano Bruno in these terms: 'In all there is a spirit; there is not a body, however small it may be, that does not contain a particle of the divine substance which animates it.' This ennobled idea of God forms the foundation of that religion in which have thought and lived the most noble minds of antiquity and of modern times, that is, the religion of pantheism. Of this Goethe said: 'Certainly, there is no more beautiful manner to honor God than to do away with all images; the most beautiful worship consists in a dialogue between nature and our heart. Thereby we arrive to the elevated and pantheistic conception of the unity of God and of nature.'" (E. Haeckel, *Natürliche Schöpfungsgeschichte*, 7th edit., 1879, p. 64.)

God, therefore, is not distinct from nature; in other words, there is no God. Consequently, there is no Providence, no hell. M. Dally, an evolutionist tells us this:

"We present ourselves with a complete doctrine, whose parts are connected, about man, about his relations with the inanimate world and with the living world. We have views about his origin and these views have a basis analogous to the most solid ones; we also have for the future the hope supported by reason of a better destiny (in the future transformations). For the first time, the philosophy of man supports itself upon biology, which itself rests upon the inorganic sciences." (*L'Ordre des primates et le transformisme*, 1868, p. 41.)

It is this natural and materialistic philosophy, these conceptions diametrically opposed to those of Christianity which Haeckel has deducted and which he tries to make triumphant by ruining all religion. It is, therefore, important to study in detail this new Gospel, upon which its falsifiers built such great hopes; we have to subject it to an impartial but rigorous criticism, in order to appreciate its value and to judge its solidity. But as Monism has Darwinism for basis, it is necessary to examine first the doctrine of Darwin: then we shall expose that of Haeckel.

CHAPTER VI.

EXPLANATION OF DARWINISM.

WHILST Voltaire made the attempt in the eighteenth century to cast floods of ridicule on Holy Scripture and on Christianity, his friends commenced aside of him to try new tactics, quite little noticed at that time, but which should become one day infinitely more dangerous: they turned science against religion. The natural sciences assumed new life everywhere and prepared that wonderful development whose fruits our time has gathered. Some of those who cultivated them permitted themselves to be carried away by the results which they had already obtained or which they believed to obtain. Keen and rash minds soon beheld nothing else above science. It was for them the queen of the world, the hope of the future, the explanation of the enigma of the past. Soon they went that far as saying that God is henceforth "a useless hypothesis." Science was sufficient to all and rendered an account of all. The supernatural should disappear from the origin of things as from the history of mankind: to the Biblical Genesis they substituted the scientific Genesis.

The *Telliamed*, in 1748, maintained that all the animal species that people the earth and air, man himself, derived from a series of evolutions, from marine species, produced by the primitive vital germ.* From 1763 to 1768, M. Robinet, in his book *De la Nature* and in his *Considerations philosophiques* also prepared the way for evolution: "A worm, a shellfish, a serpent," he says, "are like so many chrysalides of the prototype, which pass from the state of a plant to that of a beetle, from the state of a beetle to that of a crustacea, and from the state of a crustacea to that of a fish." (J. B. Robinet, *Considerations philosophiques sur la gradation naturelle des formes de l'être*, etc, Paris, 1768, p. 81.)

Figures accompanying the text show how nature made the attempt to form man in the production of minerals and vegeta-

* *Telliamed* or *Entertainment of a Hindoo Philosopher with a French Philosopher*, by Benoit de Maillet. His book was published at Amsterdam by one of his friends in 1748

bles. For instance, in the turnip, he sees an attempt of the woman, and in mushroom an attempt of man.

In the same period, Diderot arrives from his part to scepticism and replaces the Creator by heterogeny, the spontaneous generation and evolution. The most of the ideas of Darwin are found in the writings of Diderot like in those of Lamarck, published a few years afterward (1801): substitution of the progressive development of the beings to the doctrine of the final causes, negation of the fixity of the species, sovereign influence of the surrounding, organs produced by the wants. J. B. Lamarck (1744-1829) was the chief precursor of Darwin, in France, at the beginning of the last century. In Germany, Goethe had also prepared the minds for the evolutionary doctrines by his studies on the *Metamorphoses of the Plants* and various other analogous labors. However all these evolutionary germs had remained like lost in the *Telliamed*, the *Philosophie zoologique* and other similar works: they should be hatched out by Charles Darwin. The system has well merited the name of Darwinism.

Darwinism dates, as we stated already, from the year 1859. In this year Charles Darwin (1808-1882) published his book entitled, *The Origin of Species*. We have to study with some detail the system he exposes therein, because it is, so to speak, the Code of Evolution. However, we have to remark first, in order to be exact, that Darwinism is not identical with Evolution. The evolutionists carefully distinguish the theory of selection or Darwinism from the theory of descent or Evolutionism, properly speaking, and from the general theory of evolution or Monism. The universal theory of evolution "maintains that there exists in entire nature a great evolutionary, a continual and eternal *processus*, and that the phenomena of nature, without exception, from the movement of the heavenly bodies and the fall of a stone unto the growing of the plants and the conscience of man, take place in virtue of one and the same law of causality; in short, that all is reducible to the mechanism of the atoms. Mechanic or monistic conception of the world, or, in one word, *Monism*." (E. Haeckel.) The theory of descent, for which they have reserved the special name of *Evolution*, explains through the gradual and successive transformations the origin of the organic species, so that, according to this theory, all the complex, vegetable, and animal organisms are derived from simple organisms. It admits

in the beginning of the beings only one primitive form or at least a very small number of forms from which all the others have descended. Finally, the theory of selection, consists in attributing to the proceeding of the selection, which we are now going to explain, the origin of the species. It supposes the indefinite variability of the species and their transmutability. The latter are not original. They produced themselves, like the varieties which we notice every day in the same species, by modifications and accidental changes, due especially to the selection and which became fixed afterward in a manner so that they perpetuate themselves and become lasting. It is this theory, explaining by mechanical causes the transformation of the species, which is Darwinism properly speaking. The Monists and Evolutionists are generally Darwinists, but the Darwinists do not accept all the doctrines of the first systems.

These indispensable notions having been given, we can now explain the system of Darwin. He himself has related to us its history. The first idea thereof was suggested to him through the observation of the means which the breeders of domestic animals employ to perfect them. These means are what is called *the artificial selection*. By a *selection* or intelligent choice of reproducers, they succeed, with the help of the crossings of races, to form new varieties. Why, Darwin asked himself, does the "natural selection" not produce the same effects as the artificial selection? From this remark his whole system went forth. The natural fact that served to him as starting point, is therefore, the variation which takes place in the outward forms and qualities of the animals and plants, placed under certain peculiar conditions. In considering attentively the created beings, we notice that each individual has, besides the common character, characteristics that are peculiar to it, that none resembles the other in a complete manner. All the actual pigeons descend from one single stem, the rock-dove (*columba livia*). By a series of accumulated variations, they became so different among one another that we count to-day 288 well-shaped varieties. The most of these variations which distinguish the races of the domestic pigeons are derived from the artificial selection. Through the industry of the breeders and the intelligent choice of the pairs which they unite, accidental qualities perpetuate themselves through heredity, increase and develop themselves; thus all is changed, the beak, the wings, the tail, the feet, the feathers, and the color; the

pigeon called the Tumbler, has a short face with a small and conic beak, the Barb has a large and short beak, that of the English Messenger is straight, long, and narrow with its enormous caruncles. The number of the feathers of the tail varies from 12 to 42. The proceedings by which they have obtained these results are well known.

These incontestable facts being established, Charles Darwin asked himself whether one might not draw from it the explanation of the origin of the species, that is, whether there were no analogous causes that had given to the plants and to the savage animals the characteristics that distinguish them. Nature, to transform the already existing beings and to produce new species, can undoubtedly not act with intelligence and premeditation like the English breeder, but what man does consciously, it does spontaneously or negatively, said Darwin, and it is here that, properly speaking, his system begins, that constitutes its originality. The human will explains the artificial selection; the *vital concurrence*, the *struggle for life* explains the natural selection.

"The fruitfulness of the vegetables is often done through the interposition of insects, which, in pilfering for themselves, carry off from one flower to another the pollen with which their hair is covered. Moreover, certain flowers are visited only by certain kinds of insects. Now Darwin assured himself that the clover and pansies are visited only by the drones. Consequently, the more numerous the latter are, the more surely will be the fruitfulness of these two plants accomplished. But the number of the drones depends greatly upon that of the field-mice, who make a continual war on their nests. In their turn, the latter are hunted by the cats. For each field-mouse eaten by the latter, a certain number of drones' nests escapes destruction, and their larvæ, having become perfect insects, will go and fecundate clover and pansies." (De Quatrefages, *Charles Darwin*, pp. 90, 91.)

Hence there is war between cats, field-mice, and drones, and the propagation of the clover depends on the issue of the battle. More plants and animals would rapidly produce themselves upon earth than our globe could nourish and even contain, if the struggle for life would not reduce them in becoming proportions.

"From the accounts collected by Bonnet and other naturalists, it goes forth that, if during one summer the sons and grandsons of

one single plant-louse would remain undisturbed and would be placed aside of one another, at the end of the season, they would cover about five acres of ground. Evidently, if the entire globe is not invaded by plant-lice, it is because the figure of the dead infinitely surpasses that of the living. Finally, it is clear that, if the multiplication of the codfishes and of the sturgeons, whose eggs can be counted by hundreds of thousands, were not stopped in some manner, all the oceans would be filled with them at least during a man's life. . . . Thus, as no more individuals arise as there can live, there must be among them, in every case, a struggle for life, either with an individual of the same species, or with individuals of different species, or with the physical conditions of life." (Lucrece, v., 846-848, edit., Teubner.)

The struggle for life is the condition of the *Crescite et multiplicamini*; this is "the doctrine of Malthus applied to both the animal and vegetable kingdom."

"The struggle for life is therefore a general and continual fact. Under the apparent calm of the most pleasant field, of the most fresh grove, of the most immovable pool, the struggle for life is hidden; but it exists, always the same, always pitiless. It is really something strange if we stop and consider this relentless, unmerciful war, which stops neither day nor night, and continually arms animal against animal, plant against plant. There is something still more strange and really wonderful to see arise from this disorder the harmonies of the organized world, so often sung by the poets, so justly admired by the thinkers." (De Quatrefages, *Charles Darwin*, p. 92.)

There are conquerors and conquered in this war to death. The greatest number perishes on the battle-field. The victims are those who, under some respect, have a relative inferiority. The victorious are those who carry the victory over their concurrents through their strength or through some other natural quality. The result of this struggle for life is what Darwin calls the *natural selection*. The action exercised in the long run by this cause is considerable:

"From the law of accumulation results small differences by way of heredity. . . . In each of the generations that succeed one another under the domain of the same conditions of existence, the same qualities, the same peculiarities of organization are necessary to each individual to defend himself against the others and against

the outside world. Those only resist who possess these qualities, these peculiarities in the highest degree. Consequently, every time an organism makes a further step in a way that is traced to it beforehand and from which it cannot deviate, it obeys what Darwin calls the *law of divergency* of the characteristics. Hence it separates itself more and more from the starting point, and finally ends in differing at first slightly, then, in a more decided manner from the primitive organism. Thus take rise, according to Darwin, not only the *varieties* and *races*, but also the *species* themselves, which are for him perfected varieties or races." (De Quatrefages, *Charles Darwin*, p. 93.)*

It is true, indeed, that the natural selection may produce and really does produce varieties and races, but it can never produce species, as we shall see further on.

To the natural selection, first cause of variations in the animal and vegetable species, is joined a second factor which Darwin calls the *sexual selection*. "This form of selection does not depend upon the struggle for life with other organized beings, or with ambient conditions, but on the struggle among the individuals of one sex, generally the males, in order to secure the possession of the other sex." (Darwin.) These struggles are often real battles, like among the stags and certain fishes. Ordinarily, the result is the death of the conquered, but as the conquerors carry the victory through their exterior qualities, they transmit upon their descendants their characteristics of superiority and thus elevate their race.

We have to add to natural and sexual selection, as source of variations in animals and plants, the *influence of the surrounding*, each being seeks to *adapt itself* to the surrounding in which it is placed, and this *adaptation* is the third law of the organic world.

"The fact that the variations and monstrosities present themselves much more frequently in the domestic state than in the state of nature, the fact that the species having a very extensive habitation are more changeable than those having a restrained habitation, authorize us to conclude that the variability must ordinarily have some relation with the conditions of existence to which each species

* We make these quotations from Quatrefages, because his explanation clearer than that of Darwin, has been acknowledged by the latter as being exact. (*Ibid*, p. 94..)

has been subject during several successive generations." (Darwin, *The Origin of Species*, p. 114.)

In other words, the nature of the ambient conditions, the climate, the nourishment, etc., are causes which bring on more or less profound changes and modifications in the native constitution. The wild boar, having become a domestic animal, has lost its nocturnal habits and its organic conformation has modified itself. The beaver, disturbed in the construction of its dams, has ceased to be a sociable being and builder, it has become a solitary and terrier and has replaced its ancient huts by long and pierced trenches along steep banks of rivers.

"E. Forbes affirms that the shellfishes, in the southern extremity of their habitation, assume, if they live in shallow waters, much more brilliant colors than the shell-fishes of the same species that live more in the north and at a greater depth. M. Gould has observed that the birds of the same species are more brilliantly colored if they live in a country where the air is always pure than if they live on shores or islands. Wollaston assures us that the residence on seashores affects the color of insects. Moquin-Tandon gives a list of plants whose leaves become charnel-houses, if they grow on seashores, although this phenomenon does not take place in any other situation. . . . All the fur dealers know very well that the animals of the same species have a much thicker and more beautiful fur if they live in a northern country." (*Ibid.*, pp. 145, 146.)

One of the most striking proofs of the influence of the surrounding is the *return* toward the primitive characteristics. "Our domestic varieties, in returning to savage life, gradually assume, but invariably, the characteristics of the primitive type." (*Ibid.*, p. 15.)

Atrophy.—A fourth cause of variations among the organized beings is the use and non-use of the organs. The use strengthens and develops the members; the inaction or non-use tends, on the contrary, to atrophy them. If one muscle or member is frequently exercised, it increases in strength, if there is no excess in the fatigue. The arm of the blacksmith, the calf of the dancer, are well-known examples of this fact of experience. The organs that remain in rest develop themselves less. We know how the Greeks obtained strength and suppleness by means of gymnastics.

"Proportionately to the rest of the skeleton, the bones of the

wing weigh less and the bones of the thigh weigh more at the domestic dug than at the savage dug. One can incontestably attribute this change because the domestic dug flies less and marches more than the savage dug." (Darwin, *The Origin of Species*, p. 12.)

Movement causes the blood to stir toward the active part; it brings thither the nutritive elements in greater abundance, it hastens the combustion of the carbonate principles by their combination with oxygen; the respiration and the general circulation are accelerated; the assimilation of nourishments is more rapid and the muscular power increases. Hence one can easily understand the development of organs that are more in use. The non-use, on the contrary, brings on atrophy of the useless organs.

"The moles and some digging gnawers have rudimentary eyes, and even are sometimes completely covered with a pellicle and hair. This state of the eyes is probably due to a gradual diminution deriving from the non-use, undoubtedly increased by the natural selection. . . . We know that several animals, belonging to the most different classes, which inhabit the subterranean grottoes of Krain (Austria-Hungary), and those of Kentucky (United States), are blind. Among some crab-fishes, the peduncle carrying the eye is preserved, although the apparatus of the vision has disappeared, that is, the support of the telescope exists, but the telescope itself and its glasses are wanting. As it is difficult to suppose that the eye, although useless, can be hurtful to animals living in darkness, we may attribute the absence of this organ to the non-use." (*Ibid.*, pp. 149, 150.)

The law of *Correlation of crossing* is a fifth cause of variations in the organized beings. It consists in this, that the intervening changes in certain organs, or in certain apparels, bring on corresponding changes in other organs or in other apparels, although sometimes we notice no apparent relation between the first and the second. Darwin calls them *compensation and economy of crossing*, in calling to mind the words of Goethe: "In order to be able to spend on the one side, nature is obliged to economize on the other." We can see the application thereof in the domestic animals in the most striking manner:

"If nutrition is carried in excess toward one part or toward one organ, it is seldom that it is carried at the same time, in

excess at least, toward another organ; thus, one is hardly capable of obtaining much milk from a cow and to fatten it at the same time. The same varieties of cabbages do not abundantly produce a nutritious foliage and oily grains. If the grains which our fruits contain tend toward becoming atrophied, the fruit itself gains in thickness and quality. Among our poultry the presence of a tuft of feathers on the head corresponds to a lessening of the crest, and the development of the beard to a diminution of the caruncles." (*Ibid.*, p. 159.)

To the compensation of crossing is attached what Darwin calls the *correlative variations*.

"I understand by this expression that the different parts of the organization are, in the course of their crossing and of their development, so intimately connected among one another, that other parts become modified if slight variations produce themselves in any part and accumulate themselves therein in virtue of the natural selection. Examples are abounding. Important changes which produce themselves in the embryo or in the larva almost always entrain analogous changes in the grown-up animal. In the monstrosities, the effects of correlation among completely distinct parts are very curious; Isidore Geoffroy Saint-Hilaire quotes numerous examples in his great work on this question. The breeders admit that, if the members are long, the head is almost always this also. Some cases of correlation are extremely peculiar; thus the entirely white cats that have blue eyes are generally deaf; however, M. Tait recently has established that this fact is limited to the males. . . . The hairless dogs have an imperfect dentition; they say that the long haired and rude animals are predisposed to have long and numerous horns; the pigeons with feathered feet have membranes between the anterior toes; the short-beaked pigeons have small feet; the long-beaked pigeons have great feet." (*Ibid.*, pp. 155, 156; 12, 13.)

The law of *heredity* through the generation fixes in the race in a lasting manner, the modifications produced in the individuals through the causes we have enumerated. The peculiar characteristics that manifested themselves among the parents often transmit themselves like the typical characteristics, although they are not always communicated to all the descendants and sometimes even they pass to the grandsons without that they had been sensible in the

sons. The latter phenomenon is known under the name of *atavism*. The existence of the law of heredity is universally admitted.

"No breeder questions the great energy of the hereditary tendencies: all have for fundamental axiom that alike produces alike. . . . Who has not heard speaking of cases of albinism, of thorny skin, of hairy skin, etc., hereditary among several members of one and the same family." (*Ibid.*, p. 14.)

When a variety thus formed has received a well-defined organization, the variability is suspended, the acquired organization transmits itself as such by way of heredity, so as to constitute varieties or types of an apparent stability, called species.

Behold, according to Darwin, the genesis of species: they are not primitive, unchangeable, of an absolute stability, but only relative. "The species are only well settled and permanent varieties, and each of them first existed under form of variety." (*Ibid.*, p. 553.) Darwin sums up his system in the following terms:

"It is generally admitted that the formation of all the organized beings rests upon two great laws: the unity of type and the conditions of existence. One understands by unity of type that fundamental concordance which characterizes the conformation of all the organized beings of the same class and which is quite independent from their habits and mode of life. In my theory, the unity of type explains itself through the unity of descent. The conditions of existence . . . form a part of the principle of natural selection. The latter, in fact, acts either by actually adapting the variable parts of each being to its vital organic or inorganic conditions, or by having adapted them to these conditions during the long elapsed periods. These adaptations have been, in certain cases, called forth through the increase of the use or non-use of the parts, or effected by the direct action of the surrounding, and, in every case, have been subordinated to the diverse laws of crossing and of variation. Consequently, the law of the conditions of existence is in fact the superior law, because it comprises, through heredity, former variations and adaptations, that of the unity of type." (*Ibid.*, pp. 226, 227.)

CHAPTER VII.

CRITICISM OF DARWINISM.

WE HAVE explained the theory of Darwin. What have we to believe of it? Let us remark in the first place that, maintained within certain limits, it is not necessarily in contradiction with the Bible:

"Supposed that the theory of Darwin was demonstrated by incontestable proofs, and that, what I regard impossible, the natural sciences succeed in proving that all the species of plants and animals that have existed and which still exist can be reduced to some primitive forms, would there be a contradiction between the Bible and the natural sciences? I do not believe so." (Reusch, *Die Bibel und die Natur*.)

The Bible teaches that the universe is the work of a Creator who has produced the world for a determined end. This double truth *of the creation and of finality* is reconcilable with Darwinism. The Darwinists themselves are agreed to this. Behold what Sir Charles Lyell says: "The ensemble and the succession of the natural phenomena can be only the material application of an arrangement conceived beforehand, and if this succession of events can be explained through the transmutation, the perpetual adaptation of the organic world to new conditions leaves as powerful as ever the argument in favor of a plan and consequently of an architect." (*The Antiquity of Man*, 1863.)

Lamarck, who taught evolution before Darwin, expressly admitted the existence of God and His Providence. He said: "Among the different confusions of ideas to which the subject I have in view here has given rise, I shall quote two principal ones. . . . The one among them is that which makes many believe that nature and its supreme author are also synonymous. . . . Nature is in some sort only an intermediary between God and the parts of the physical universe for the execution of the divine will. . . . They thought that nature was God itself. . . . Strange thing! they have confounded the watch with the watchmaker, the work with its author. Certainly, this idea is inconsequent. . . . As to the laws of

nature, they are only the expression of the same will that established them, after having them primitively combined for the end He has proposed to Himself." (*Histoire naturelle des animaux sans vertèbres*, 1835, pp. 258, 272, etc.)

But not only does Darwinism not exclude by itself the intervention of God in the creation of the world, it speaks on several points like the Bible. De Maillet, in the *Telliamed* (p. 226), had already made the following remark: "Notice, if you please, that your books (Genesis) are in agreement with me about the formation of the globe and of all the animated things contained therein. They point out all the successive states through which I establish that the earth has passed, before it attained the state in which we see it. They agree that it was in the beginning only an informal mass covered by water, upon which the spirit of God was moving; that these waters diminished through the separation that was made thereof, and because a part thereof was transferred into other places; that through this separation there appeared at first a dry earth, which afterwards was covered with green; that after this it was peopled with animals, and that man was the last work of God's hand, who previously had made all the other things. Now, it is this precisely what I believe and what I have explained to you. The term of six days marked in your books for the perfection of all the works is metaphorical, as you might believe; it cannot designate the time which the earth employs to turn six times around itself in its annual course around the sun, because, according to these books, the sun was created only on the fourth day."

Also Haeckel is obliged to acknowledge the points of contact that exist between Genesis and Darwinism: "In the Mosaic hypothesis of creation, two of the most important fundamental propositions of the evolutionary theory reveal themselves with a surprising clearness and simplicity: they are the idea of division of the work or of the differentiation and the idea of the progressive development or of the perfecting. Although these great laws of organic evolution, these laws which we shall prove to be the necessary consequence of the geological doctrine, may be regarded by Moses as the expression of the activity of a Creator fashioning the world, still we discover therein the beautiful idea of progressive evolution, of a gradual differentiation of a primi-

tively simple matter. We can, therefore, pay to the grand idea contained in the hypothetic cosmogony of the Jewish legislator a just and sincere tribute of admiration, without acknowledging therein what they call a divine manifestation." (*Natürliche Schöpfungsgeschichte*, 1874.)

Genesis is, therefore, not in formal opposition with the theory of natural selection, in so far as the latter is distinct from the theory of descent. Aside of the question of first cause and of finality, Darwinism essentially consists in admitting a continued progress in the production of the beings and a relation of filiation among the various beings, the most perfect descending from the less perfect by a sort of generation. Of these two Darwinian ideas, the first, that of progress, is biblical: Moses shows us a very marked ascending gradation in the creative work; the second, that of filiation, does not appear in the account of Moses, but we cannot say that its language absolutely excludes it, in at least restraining it within certain limits. Each genetic day is characterized by the production of a new species of beings which receive existence through God's command; the most natural manner to understand this command is to see therein, not a transformation of that which already existed, but of the completely new productions; however, according to some, there is not a word in the sacred text that is opposed to the hypothesis of an evolution; there is nothing revealed about the particular manner the vegetables and animals were produced. There is only an exception for man, whose creation Genesis describes in detail.

However, it appears to be *difficult, if not impossible*, to explain Holy Scripture in the sense that the animals were issued from the plants, and the plants from the minerals, by way of evolution, as it is pretended by the followers of the theory of descent. Moses tells us that God created the plants and animals, each after its kind. This affirmation seems to be the formal condemnation of evolution without limits. But Darwinism, properly speaking, does not go as far as absolute evolution. The English naturalist admits in both the vegetable and animal kingdoms the existence of several primitive types, not of a single one, and his hypothesis may be reconciled with the language of Scripture, for the latter tells us that the animals were created by species, it does not determine the number of these species. Thus there exists no radical

incompatibility between the two explanations. For the most we can say that Darwin restrains to excess the number of the primordial species; but as he limits it only in a hypothetical manner, and as Genesis does not give any figure, the accord, as to this subject, is far from being impossible; there is only question of more or less, a question which Scripture, like Darwinism, leaves in the vague.

Thus, if one admits the plurality of the primitive species, there can be no longer any conflict in regard to their mutability. Darwin maintains that there exists to-day species that have gone forth from different species. Holy Scripture teaches us nothing about this question; it does not tell us whether it is so or not; hence the Bible is outside the combat, just as well as the Church, which has not passed any judgment on this question. Therefore, we believe that the Darwinists who admit in both the vegetable and animal kingdoms the existence of several primordial types, created by God, and from which have gone forth by way of evolution and filiation the different actual species of the organic world, teach nothing contrary to the revealed truth. Thus, for instance, the opinion of Albert Gaudry, French professor in the Museum of Natural History, according to which the secondary species are changeable, but derived from a certain number of primordial and irreducible classes, is not in contradiction with Genesis, because it admits the multiplicity of the primitive types, and does not exclude the Creator. (Cf., Albert Gaudry, *Les enchaînements du monde animal*, Paris, 1878, p. 257.)

Restrained or mitigated Darwinism is therefore not in itself in contradiction with the Bible. Consequently, it may be maintained, with the necessary restrictions, by believing savants. But if it is not an anti-Genesis, properly speaking, it is this at least by its tendencies, and by the manner the most of its defenders understand it. The number of orthodox Darwinists is very small and of heterodox Darwinists is very great. The most of those who have embraced it, go far beyond what it teaches; they accept evolution, with all its outrageous and impious consequences, as Darwin himself did within his last years. The theory of selection is for them an argument in favor of their thesis, an essential element of their system, an integral part of their doctrine, even the foundation of their hypothesis, without which all crumbles down in the building

which they raised with so much labor and pain. It is, therefore, useful to examine in detail the scientific value of the system.

Darwinism has made a real progress in natural history, in determining the causes that produce the varieties and races in the organic world; but it falls into error if, wishing to go beyond this, it pretends to explain also the origin of the species. Its discoveries explain the origin of the races, but not that of the species. According to the definitions universally accepted by all the savants before Darwin, the *species* is a collection of individuals having the same essential characteristics, issued from one and the same primitive pair and enjoying the faculty to reproduce themselves indefinitely. A group of species that have among one another common characteristics is called *kind*. The species is unchangeable in its essential characteristics, but its accessory characteristics may change under the influence of exterior agencies, and thus give rise to varieties and races. We call *varieties* the groups of individuals of the same species that distinguish themselves from the common type by accidental modifications of the species, due either to the influence of the surrounding, soil, climate, nourishment, exercise, or to crossings. These modifications are not essential and specific, but changeable and unstable. Generally they show themselves in the shape, color, or conformation. In virtue of the law of reversion, the varieties naturally return to the primitive type, if foreign causes do not force the individuals of the same variety to unite themselves in order to perpetuate their race, conformably to the law of heredity. When the particular characteristics that constitute a variety are fixed and perpetuated in a constant manner by generation, they form a *race*.

Such are the notions universally admitted by the ancient naturalists: Darwin, although he proposed to explain *The Origin of Species*, as the title of his book indicates, has always not only avoided, but refused to give a definition of the word *race* and of the word *species*. This is a gap in his work at which we must be so much more surprised, because it is voluntary and deliberate. It betrays the embarrassment of the author. It goes forth, moreover, that his conclusions rest upon an equivocal basis. However, it can be seen, by the manner he reasons, that the distinctions admitted up to him between the species and the race do not appear to him well founded, and that these words, according to his views, are only two different names of the same thing. He calls variety "a rising

species." As to the race, it does not differ by any important characteristics from the species. The debate between the Darwinists and their adversaries reduces itself, therefore, to the question to know whether there exists a real difference between the species and race. In good logic, Darwin, to establish his thesis, ought to have commenced by proving that the evolution of the species is a real fact and not to seek only afterward how this evolution takes place. He should have, in one word, posed the principle, before drawing the consequences therefrom. But he was very careful not to follow this road. He was only preoccupied to explain the fact which he constantly supposed, without having it ever established. Let us therefore follow him on the ground which he chose himself.

The followers of the system of evolution accumulate a mass of detailed proofs, from which they deduct the identity of the race and of the species. They all may be reduced to three heads: They are drawn either *from the variability of the plants and animals*, or *from embryogeny*, or *from compared anatomy*. Now, all these proofs are insufficient and faulty. None among them has established the passage from one species to another, which would be necessary to prove that Darwinism is true.

Variability.—And first, that which concerns the variability, it is a certain fact, nobody contests it, that variations produce themselves in both the vegetable and animal kingdoms. "Variability is at work everywhere in nature itself. The same plant will show differences in character according to the nature of the soil in which it is set. Much will depend on whether the soil is rich or poor, damp or dry, sand or chalk. Sometimes plants have all the colors of the rainbow. On high mountains they are smaller in size, but finer in texture; they likewise take deeper root and are more highly colored; but if set in the plains they will lose their properties. Animals, indeed, are more easily acclimatized; still, as to size, color, hair, and the like, they are capable of endless variation. Variability, then, as a principle is in general indisputable." (Paul Schanz, *Christian Apology*, I., p. 153.)

Opinions, however, will differ as to how far the principle is to extend. It is certain that variations are circumscribed within limits which they never can transgress; they always bear on accessory points, they never attain, in no case, what there is characteristic and fundamental in the species. The changeableness, in the first place,

is limited as Hartmann says: "Every breeder knows that the first degrees of modification are easier to obtain; that all the degrees following are so much more difficult to pass over the more they deviate from the normal type, and that the whole *processus* of artificial breeding, in all the directions open by nature, arrives at a limit where all attempt to push it further becomes useless. Thus, for instance, since 1852, they could not obtain any new development in the dimensions of the green gooseberries, although it cannot be seen why they should not become as large as a pumpkin, if the variability were not interiorly limited." (*Le Darwinisme*, French transl. by G. Gueroult, 1877, p. 98.)

M. Wigand remarks from his part that the natural variations are limited as to both quality and quantity. "All the varieties," says P. Schanz, "preserve the primitive type. Neither pigeons with big crops, nor sheep with bandy legs and fat tails, nor hornless cattle, nor hairless dogs belie their species, although they are abnormal specimens. The most refined natural selection has not succeeded in producing a new species, and it has been equally unsuccessful in changing a fox into a dog, or a rose into a lily or a tulip. Even the crossing of wild species (by which many a garden-variety has been produced) is limited to species that are near of kin. To pretend that the breeder can mold an animal or vegetable organism to his will, as if selection were a magic wand for raising every possible form of life, is to turn a deaf ear to the teaching of experience. In truth the breeder's sphere of operations is bounded by the qualities he finds in nature, and nature brings forth only such varieties as are well defined and exactly suit the species in question. No breeder would lay heavy stakes on producing a variety not sanctioned by nature, *e. g.*, a cock without a tail, a pigeon with spurs, a poppy with yellow blossoms, a blue pumpkin or a blue orange, a yellow grape or a yellow centifolium." (P. Schanz, *Opus cit.*, I., p. 155.)

God has traced to variability, like to the ocean, limits which it cannot pass; if it can modify, it cannot create. This is so true that the changes which artificial selection obtains persist in a lasting manner only through the constant intervention of an intelligence that presides over their maintenance. Nature is so conservative that it returns to its primitive type, in virtue of the law of return, as soon as the selector does no longer counteract its tendencies.

One day they brought to Linnæus a strawberry plant whose

culture had greatly modified the leaves. The latter, instead of being composed of three small leaves, had only one. This strawberry plant was preserved in the "Jardin des Plantes," and Du-chêne, the famous gardener of this period, saw it bloom and bear fruit. Then he tried to reproduce it by sowing its grains; in the third seed-bed he obtained a strawberry plant whose leaves had recovered their natural characteristics: they were trifoliate leaves. (L. Simon, *De l'origine des espèces*, 1865, pp. 40, 41.)

The same facts have been remarked in regard to the animals. So constant are the laws of nature! The industrial races are factitious and conditional; they depend on the climate, soil, mode of life, alliances, and on the ensemble of the regular and permanent care which the protective hand of man assures. If this hand is withdrawn, if the conditions change, even the ancient races degenerate and disappear, after having oscillated, like a pendulum, they return to their starting point.

In the second place, the variability never attains what is essential in the species. It is thus, for instance, that experience permits us to constate modifications in some organs, but never the production of a new organ, even by means of the most skillful artificial selection. "The mountebank," M. Janet remarks correctly, "has looser muscles than other men. Has he others? Has he more? Are they differently disposed?" No. The influence of the surrounding may produce physiological changes, but these changes never attain the organic forms. The use or non-use of the members favors their development or brings a commencement of atrophy; but if they influence the volume, the weight, and structure of the organs, they do not modify their form; with much more reason, the atrophy never totally suppresses an organ. This is acknowledged even by Hartmann, an evolutionary philosopher. He says: "The natural selection cannot act on the morphological relations of the structure, but simply on the adaptation to the determined physiological destinations of morphologically given organs. . . . The difference of the species, whose origin Darwin seeks to explain by his theory of selection, is by nature essentially morphological." (*Die Philosophie des Unbewussten*, II., p. 93.)

The variability has, therefore, only a limited power. It can produce lasting effects only by exercising itself within a restrained

circle; in other words, it can found races, but not species. Quatrefages says: "Indeed, we may knead and transform the organisms, but we have always obtained only *races*, never a new *species*. Consequently, to remain on the ground of facts, to judge only by that which is known to us, we may say that morphology itself authorizes to believe that never did one species bring forth another by way of derivation. To admit the contrary, it is appealing to the *unknown*, and substituting a possibility to the results of experience." (De Quatrefages, *L'Espèce humaine*, p. 71.) Professor Virchow, after having himself expressed in the same sense, continues, saying: "I only ask for proof whereby such a transformation is established; until this proof is furnished, I can admit only that it is probable. However, I was mislead and deceived so often by probabilities, that I have learned to be more cautious in future, and to wait until the facts are clearly proved." (*Correspondenzblatt*, 1871, p. 70.)

EMBRYOGENY.—Embryogeny does not furnish more conclusive proofs in favor of Darwinism. The Evolutionists considered the ensemble of the embryogenic facts as the representation of the genesis of the beings. The embryo is for them the animal itself, "less modified than it will be later on, and reproducing in its personal evolution the phases which the species presented in its gradual formation." (De Quatrefages, *Charles Darwin*, p. 139.) That which renders an account, in their eyes, is the close resemblance which we notice in the first stage of their existence among animals that will be later on so different: reptiles, birds, mammifera. The animal derives from an egg and a primitive cell. The phenomena that take place at the start are the same for all the eggs. The segmentation and the appearance of the first rudiments is done for the living beings in the same order and in the same manner.

"The embryos" says Darwin, "of the most distinct species, belonging to the same class, are generally much alike, but in developing themselves become very different. One could not find a better proof of this fact than the words of Von Baer: 'The embryos of the mammifera, birds, lizards, serpents, and probably also those of the turtles, look much alike during the first phases of their development, in both their whole as by the mode of evolution of the parts; this resemblance is even so perfect that we

can distinguish them only by their thickness. 'I possess, preserved in alcohol, two small embryos whose names I have omitted to inscribe, and actually it would be impossible for me to tell to what class they belong. They are perhaps lizards, small birds, or very young mammifera, so great is the likeness of the mode of formation of the head and of the trunk of these animals. It is true that the extremities of these embryos are still wanting; but although they were in the first phase of their development, they teach us that, the feet of the lizards and of the mammifera, the wings and feet of the birds, and even the hands and feet of man, all start from the same fundamental form. . . . How can we explain these divers facts of embryology? . . . The embryonic state or the state of the larva represents to us in a more or less complete manner the adult state of the ancestor of the entire group. . . . The hidden tie which the naturalists have sought under the name of *natural system* is nothing else but the descent. . . . The embryo is like a picture of the common animal, in the larva state, or in the adult state of all the members of a great class.' (Darwin, *The Origin of Species*, pp. 519-532.)

Thus embryogeny offers, like an abridgment, the complete history of the evolutions of the animal species. Each animated being is derived from an egg, *omne vivum ex ovo; omne ovum ex ovario*; each animated being passes, in a short time, the multiple stages which it took its ancestors many centuries to pass through. Evolution alone is capable of rendering an account of this singular phenomenon. Hence it is a proof in its favor.

Behold what the followers of Darwin affirm, but all the savants do not share their opinion. According to several naturalists, "the evolutionary argument drawn from embryology is more poetical than scientific." Upon what is founded the supposition that the individual passes through all the phases through which has passed the race to which it belongs? Upon nothing certain. Mr. Renooz maintains that the embryonic forms are at the beginning of the evolution vegetable forms. These forms follow an evolution peculiar to each species and confound themselves, when the characteristics of the animal life invade them, into a special animal form, but which from that time remains unchangeable and does never confound itself into another animal species. (C. M. Renooz, *L'Origine des animaux*, 1883, p. 141.)

The ovules of the mammifera, in their primitive state, look so much alike that one cannot distinguish them from one another, and nevertheless one ovule, in developing itself, becomes a horse, another a dog, another a whale. Therefore, there must be in each ovule a particular principle, something that physically distinguishes them one from another, although in the present state of our knowledge and with the resources at our disposal to-day, this escapes the eye of the naturalist and it is impossible for him to notice the physical differences, on account of the imperfection of our senses. There is a moment, says Coste, the creator of embryology, when the organization of the superior animal reduces itself to the simplicity of the cell.

"The egg presents the transitory image of this simplicity, for it has all the characteristics of the cell and develops itself in a similar manner. Like the latter, it is constituted by an enveloping membrane and by a cellular content; but this content, instead of undergoing the lot which is reserved to it in the common cells, tends to move constantly toward the end of its high destination. The analogy is, therefore, here *merely in the form or in the appearance*, and the difference *in the nature of the force* that animates this form and co-ordinates the materials thereof." (Coste, *Hist. du développ. des corps organisés*, 1847, I., p. 17.)

In regard to our subject P. Schanz says: "The attempt to establish a complete identity of embryos has signally failed. Professional Darwinists exposed and tore into shreds Haeckel's clumsy scheme in which the embryos of the tortoise, the hen, the dog, and man were drawn to one and the same scale. Haeckel apologized. He had drawn up the scheme, he said, on purpose to bring out the points of agreement into bolder relief! The breath of such an excuse will hardly resolve his deceit into dew; it cannot but awaken mistrust. Such is the progress of development in organic beings. The matter changes, but life and form remain the same. The same plan of organization pervades all species of plants and animals. Running through them all is a uniform law of formation peculiar to the species." (P. Schanz, *Christian Apology*, I., p. 137.)

The first sensible progress in the evolution of the egg of the higher animals consists in the formation of the blastoderm, *i. e.*, of the general envelope of the skin of the new being. This rudiment gives to it a certain resemblance with the lower animals, such as the

medusæ and hydridæ, in which the general envelope fulfills all the functions and constitutes the entire adult organism. But continues Coste: "In one point of the blastodermic side, there manifests itself quite early a primitive or vertebral line of which the lower animals never present any trace, and it is precisely this which causes that these resemblances can never have the character of identity, and that, quite in expressing the evident idea of a general plan common to all the beings, it excludes the possibility of a transfiguration under the influence of outside agencies." (Coste, *Opus cit.*, p. 18.)

Agassiz confirms the assertions of the French professor, when he says: "They have maintained in the most general terms that the higher animals pass, during their development, through all the phases that characterize the lower classes. Thus formulated, this proposition is entirely contrary to truth. . . . All the animals, in their primitive condition look alike in the eggs. But as soon as the embryo commences to show some characteristic traits, the latter present such peculiarities that the type may be distinguished. Therefore, we cannot say that there are in the animal certain phases of development which do not enter within the limits of its proper branch. At no moment of its development is a vertebrate an articulate or resembling it; never is an articulate a mollusk, nor a mollusk a radiate, and *vice versâ*. . . . No higher animal passes through a series of phases representing all the lower types of the animal kingdom, but it simply undergoes a series of modifications, peculiar to the animals of the branch to which it belongs." (J. L. R. Agassiz, *De l'espèce*, pp. 278, 279.)

Moreover, as Agassiz has also established, the characteristics of the species manifest themselves before those of the order, and before those of the kind, which is in formal discord with the geological succession of the evolutionists. He says: "As to the characteristics of the kind, we can say that it is very rare that they accentuate themselves in any type of the animal kingdom, before the specific traits are mostly entirely designated, if not completely formed. Can there be the least doubt that a human embryo belongs to the human kind, even before one single tooth has pierced through? Is a young cat, a young dog, not recognizable as cat and dog before the claws and teeth indicate their kind? Is this not true of the lamb, of the kid, of the chicken, of the young rabbit, of the little mouse, of many birds, of reptiles, fishes, insects, mollusks, and radiates? And

why? Simply because the proportions of the parts, that constitute the specific characters, are recognizable before the completion of the details of the structure, which characterize the kind." (J. L. R. Agassiz, *De l'espèce*, pp. 280, 281.)

Finally, the fact alleged by the evolutionists is not universal and it has been singularly exaggerated. The cuts in which Haeckel represented the different embryos to render their similitude more sensible and more striking, appeared at first to be a triumphant argument in favor of his thesis, but to-day it is proved in Germany, as we remarked before, that these cuts are a falsification of the figures of *MM. His et Semper*. This so striking resemblance is, therefore, in reality the result of a fraud. It is certain, according to the avowals of Darwin himself, that all the animals do not pass, without exception, through the different states of their so-called ancestors. (Darwin, *The Origin of Species*, pp. 524, 531.) However, the laws of nature are general, and if the explanation of the embryonic development were that which the Darwinists suppose, it should not suffer any exception. The law that rules the formation of the animals in the first period of their existence is therefore not a proof of the system of Darwin.

COMPARATIVE ANATOMY.—*Rudimentary Organs*.—The third argument of the evolutionists is not more conclusive. One of the principal reasons which they bring forth, the most popular, and that which most lively strikes a certain number of minds, is that which they draw from comparative anatomy. It is founded on the existence, among a great number of animals, of rudimentary, atrophied and abortive, and completely useless organs. "It would be difficult," says J. Lubbock, "to name a higher animal at which there does not exist some part in the rudimentary state. At the mammals, for instance, the males always possess rudimentary breasts; at the serpents, one of the lobes of the lungs is rudimentary; at the birds, the bastard wing is only a rudimentary finger, and at some species the entire wing is so rudimentary that it is useless for flying. What is more curious than the presence of teeth at the foetus of the whale, which, when grown up, have no trace of these organs; or like the presence of teeth which never pierce the gum in the upper jaw of the calf before its birth? . . . They generally say, in the works on natural history, that the rudimentary organs have been

created *in view of the symmetry, or to complete the plan of nature*; but this is only a simple repetition of the fact and not an explanation. . . . In the hypothesis of descent with modifications, the explanation of the origin of rudimentary organs is comparatively simple. . . . It seems probable to me that the want of use has been the principal cause of these phenomena of atrophy; that this want of use, in one word, must have determined at first very slowly and very gradually the more and more complete diminution of an organ, until it became rudimentary. We might quote, for example, the eyes of animals living in dark caves, and the wings of birds living in the oceanic islands, birds which, rarely forced to fly up in the air to escape wild beasts, have ended by losing the faculty of flying. . . . Whatever may be the phases which they passed through to bring them to their actual state which renders them useless, the rudimentary organs, if they preserved themselves through heredity alone, give us an idea of the state of the primitive things. . . . We may compare the rudimentary organs to letters which, preserved in the orthography of a word, although useless for its pronunciation, serve to trace back its origin and filiation. Therefore, we can conclude that, according to the doctrine of descent with modifications, the existence of organs which their rudimentary and imperfect state renders useless, far from constituting an embarrassing difficulty, as this is certainly the case in the ordinary hypothesis of creation, ought, on the contrary, to have been foreseen as a consequence of the principles which we have developed." (J. Lubbock, *Fifty Years of Science*, 2d edit., London, 1882, p. 7.)

Darwinism, in explaining through atrophy the rudimentary organs, explains only at the same time that striking likeness of forms, which we remark under an apparent diversity, in the different species of animals actually existing. Outside of this system, it is impossible, say the Darwinists, to discover by what strange coincidence the structure of the bones is so alike in the arm of man, in the wing of the bat, in the front leg of the horse, and in the fin of the porpoise, and how the neck of the giraffe and that of the elephant contain the same number of vertebræ.

Let us remark first that the anatomical likeness has not the importance which the Darwinists attribute to it. The resemblance

of the skeleton is entirely insufficient to establish the identity of species. The horse, the ass, zebra, and the hemione are very different animals; nevertheless they resemble one another in such a manner by the skeleton that it is impossible to determine them by the osteological characters alone. If these four species were buried together, the paleontologists of the future would be obliged to reduce them to one.

J. L. R. Agassiz, the famous naturalist of the Cambridge University, in the United States, far from drawing from the likeness of the structure of the animals a proof in favor of the evolution of the species, deducts therefrom, on the contrary, an argument in favor of the creation. He says: "There is nothing in the organic kingdom of a nature that impresses upon us so much than the unity of plan, which appears in the structure of the most different types. From one pole to the other, under all the meridians, the Mammifera, the Birds, the Reptiles, the Fishes reveal one sole and the same plan of structure. This plan describes abstract conceptions of the highest order; it goes far beyond the most vast generalizations of the human mind, and it needed the most laborious inquiries for man to arrive only to form an idea thereof. Other not less wonderful plans show themselves in the Articulates, Mollusks, and Radiates, and in the different types of the plants. And, nevertheless, this logical relation, this wonderful harmony, this infinite variety in the unity, behold what they present to us as the result of forces to which belong neither the least particle of intelligence, nor the faculty of thinking, nor the power of combining, nor the notion of time and space! If something can place, in nature, man above other beings, it is precisely the fact that he possesses these noble attributes. Without these gifts, none of the general traits of relationship that unite the great types of both the animal and vegetable kingdoms could be neither perceived nor understood. How therefore could these relations be imagined, if not with the help of analogous faculties? If all the relations surpass the intellectual bearing of man, if man himself is only a part, a fragment of the total system, how could this system have been called into being, if there is not a supreme intelligence, author of all things?" J. L. R. Agassiz, *Rapports des animaux entre eux et avec le monde ambiant* (*Revue des cours scientifiques*, May 2, 1868, pp. 351, 352.)

As to the rudimentary organs, Darwin considers them as useless, but nothing proves that they are this indeed. We are far from knowing in a perfect manner the working of all the parts of the organized being. It is therefore greatly possible that the rudimentary organs, like the wings of the apteryx, serve to an end that is unknown to us. We ignore so many things! We should always say with Linnæus: *Deum omniscium*; . . . *legi aliquot ejus vestigia per creata rerum*.

The uniformity of plan followed by the Creator in His works can besides very well, whatever evolutionists may say, explain the presence of useless organs in certain animals. God has thus imprinted upon them the signs of their relationship with their congeners. Instead of being an argument in favor of evolution, Agassiz remarks, "The existence of a rudimentary eye discovered by Dr. J. Wyman in the blindfish (*Amblyopsis spelæus* of the cave of the Mammoth, in Kentucky), does it not rather prove that this animal, like all the others, was created, with all its peculiar characteristics, by the *fiat* of the Almighty, and that this rudimentary eye was left to it as a reminiscence of the general plan of structure upon which is built the great type to which it belongs?" (J. L. R. Agassiz, *De l'espèce*, p. 20.)

Moreover, Darwinism is far from rendering an account of all the facts. Every organic peculiarity, at least if it is very noticeable, should explain itself by the very use of the organs. But, it is not so, as Darwin himself is obliged to admit. The Magellan goose and the frigate have palmed feet for swimming and nevertheless they do not swim. An American woodpecker (*Colaptes campestris*) has the feet of a climber and nevertheless does not climb. The petrel is one of the most ærial sea-birds known; however in the quiet bay of Fire-Island, it might be taken for a grebe or penguin, on account of its general habits, its extraordinary facility to plunge under water, if one can decide it to do so; nevertheless this bird is essentially a petrel. Behold a great number of cases in which, if the Darwinian explanation were correct, certain organs ought to be atrophied by the non-use. But, they are this not at all. What must we conclude from this, if not that the explanation of the author of *The Origin of Species* is insufficient and incomplete?

How many other facts which are equally mysterious for Darwinism! Thus it is powerless to explain the existence of the neuters, so numer-

ous in the bee-hives and in the ants' nests. This however is a notable point in natural history. The isolated cases of sterility in the animal kingdom are only accidental and teratological, and consequently can be explained without great difficulty; but here "there is question of a regular and a normal production of individuals at whom the organization transforms itself in a manner as to assure the unfruitfulness, although they are derived from fathers, mothers, and ancestors all fruitful since the species exists. Here is a derogation from one of the most general rules of the organized world." (A. de Quatrefages, *Charles Darwin*, p. 164, *cf.*, pp. 162-167.) Darwin himself, as well as many others of his followers, has been unable to find any satisfactory reason for this phenomenon.

THE THEORY OF SELECTION IS WANTING.—The theory of selection explains, therefore, not what it pretends to explain; it is far from lifting all the veils that hide the secret of the mysteries of nature. The arguments which it brings forward in its favor are neither peremptory nor conclusive. They furnish for the most, only presumptions and probabilities. But if these probabilities would exist, they would vanish at the light of the facts, considered in their real point of view. This is what we are now going to prove.

In all their discussion, the Darwinists do not bring forward one single positive proof in support of their fundamental thesis. They maintain that the species precede one another by way of genealogy, and they cannot quote one single fact of the passage of one species to another. They draw the most from the less, the universal from the particular. There is hierarchy in the ladder of the beings, and they assure us that there is a genealogy therein: they state the resemblance, and affirm the descent; they notice the variability, and they decide the transmutability. They conclude from the *possibility* of their system on its *reality*. However, as the scholastics say very correctly: *a possibili ad actum non valet consecutio*. The possibility is far from implying the existence. Except what is in itself contradictory, all is possible. But how many possible things do not exist! Now, science is the study of facts, not of possibilities; it supports itself upon observations and upon experience, and if it has the right to invent hypotheses to connect the phenomena among one another and to make natural philosophy, it does this only under condition not to contradict the phenomena which we remark in the actual world and to respect the laws of nature whose daily application we constate with our eyes.

Every theory that is in opposition with the facts and laws of nature must be rejected by the naturalist, as contrary to the scientific principles and method. Now the hypothesis of the mutability of the species is in opposition with the facts. Both history and experience attest to this.

HISTORY AND GEOLOGY.—History and geology, as high as one may go back in the study of the history of the past, confirm the stability of the species. Thus, in the house of a painter of Pompeii, which was buried in the year A. D. 79 under the ashes of Vesuvius, there has been found a collection of shells, in a perfect state of preservation. The species that compose it still exist with the same characters, without any difference. Therefore, they have not undergone any variation since eighteen centuries. At Herculaneum, they found, in the store of a fruit-dealer, vessels filled with almonds, chestnuts, other nuts, and carob-beans which perfectly resemble those of our days. The anatomical description, made by Galen, of apes which he had dissected at Alexandria in the second century of the Christian era, permitted Camper to recognize that these apes belonged to the baboon species, so much has the species remained unchangeable. Aristotle, dead more than 2,200 years, has left to us numerous descriptions of animals of Greece and of Asia embracing from the sea-nettles until the higher animals. They are so correct that Cuvier could say with right that the history of the elephant is more exact in Aristotle than in Buffon. From the reading of these writings it goes forth that no change at all took place between the species that lived in his time and those that still live to-day. The monuments of Egypt permit us to go back far beyond Aristotle. Here also, both the animal and vegetable kingdoms present themselves such as they are to-day, without variation. The animals, the plants, the grains buried in the hypogea of Egypt, are the animals and plants that live in the twentieth century on the shores of the Nile. It is the same with those which are represented by paintings, sculptures, and bas-reliefs which abound in the ruins of this country.

GEOLOGY AND PALEONTOLOGY.—Geology and paleontology permit us to go much further back in the past,—far beyond the limits which history can reach, and its testimony is the same. Darwin has been obliged to acknowledge that the skeletons of animals have not been changed since the glacial period. According to Agassiz the southern extremity of Florida has been formed by the accumula-

tion of the corals of the tropical seas, and, if his calculations are correct, the formation of those coral reefs required no less a period than two hundred thousand years. Now, if we compare the zoophytes which have formed the uppermost ledges of these reefs with those which formed their lowest strata, we cannot verify any difference between them. The comparison of the flora of the glacial period with that of our time leads to the same results. There has been discovered near Hohenhausen, in the canton of Zurich, in the midst of a peat-marsh, quite a collection of the flora of those ages. These débris are embedded in peat whose formation, according to certain geologists, must have taken place between the two glacial epochs. The yew-tree, the wild pine, the larch, the birch, the maple, the nut-tree, in its two kinds, have been recognized as having existed in an age certainly anterior to ours. They have been compared with the same species as they now grow, and no difference has been found to exist between them. In a word, history and natural sciences prove the stability and permanence of the species: Darwinists cannot cite one historical instance of the gradual transition of one species to another; their system is therefore in contradiction with facts.

THE STERILITY OF HYBRIDS.—However, the Evolutionists do not consider themselves beaten and they pretend that what was not produced within historic times could produce itself in epochs remote from us many hundreds of centuries, although geology has not preserved to us any traces of these changes and revolutions. A system which is reduced to appeal to the unknown is no longer a scientific system; it does not rest upon proofs, but upon pure imaginations. However, let us pursue the defenders of the variability of the species until in this last intrenchment and prove to them, by natural history and experience, that the species, such as they are constituted, could never have changed.

In order that the mutability, *i.e.*, the production of new species, was possible, it would be necessary that the products of the union of two different species could perpetuate themselves in an indefinite manner. Now experience proves that it is not thus. "If the species were changeable, the hybridation would be certainly the most direct and the most efficacious means to operate this change. Not at all, the hybridation is the means which most completely settles the fixity of the species." (P. Flourens, *Examen du livre de M.*

Darwin sur l'origine des espèces, Paris, 1864, p. 91.) All the attempts undertaken to produce new and stable species, by means of two different species, have been without success, all the efforts of the most skillful artificial selection have run aground against the laws of nature. It could obtain hybrids, that is, individuals born from parents of a different species, but these hybrids are deprived of the faculty to perpetuate themselves without interruption. (See A. Godron, *De l'espèce et des races*, Vol. I., p. 197 ff.)

This sterility of hybrids furnishes a decisive proof in favor of the fixity of the species. The adherents of the variability have tried in vain to contest the fact in order to escape its consequences. It has been denied by M. Broca, but it has been maintained and firmly established by De Quatrefages and by E. Blanchard. (See *L'espèce humaine*, 6th edit., 1880, pp. 46-61.) "No doubt exists for science," says the latter, "except for the descent of some extremely close species. In the circumstances wherein one of the elements of production predominates, the other effaces itself. It is thus that the independent character of the specific types, and the impossibility to constitute a new and independent form reveals itself." (E. Blanchard, *L'origine des êtres*, in the *Revue des deux Mondes*, Oct. 1, 1874, p. 615.) "Nobody believes any more," says De Quatrefages, "in the fruitfulness of the crossing between animals belonging to different classes or families." (*Charles Darwin*, p. 234.)

As to the vegetable kingdom, the experiments of M. Naudin, although an evolutionist, have equally established that the hybrid plants cannot perpetuate themselves in a lasting manner: after a certain number of generations, they naturally and spontaneously return to the primitive type. (See Flourens, *Examen du livre de M. Darwin*, p. 92 ff.) "Thus we verify in nature much less a tendency to the fusion of the species than a force to preserve the specific characteristics. This is proved by the tendency which the cultivated plants and domestic animals have to return to their original and spontaneous forms." (O. Heer, *Die Urwelt der Schweiz*, Geneva, 1865, p. 730.)

We may, therefore, conclude with Flourens: "There are two kinds of fruitfulness: first, a continued fruitfulness; this is the character of the species. All the varieties of horses, dogs, sheep, goats, etc., mingle and produce together a continued fruitfulness.

Secondly, there is a limited fruitfulness; this is the character of the genus. If two distinct species, the dog and the jackal, the wolf and the dog, the ram and the goat, the ass and the horse, etc., are coupled, they produce offsprings which will soon be barren, and this prevents any durable intermediate species from being established. The horse and the ass have been coupled for centuries, but the male and female mule do not produce any intermediate species; for centuries the goat and the ram have been coupled, they produce mongrels, but these mongrels have not given rise to an intermediate species. Scientists ask: What is the characteristic of genus; where can we find it? It lies in the two distinct fruitfulnesses. The continued fruitfulness gives the species; the limited fruitfulness gives the genus." (P. Flourens, *Opus cit.*, p. 113.)

Finally, let us notice a last fact, which is a last proof against the theory of evolution: it is the observation established that the qualities of the animals are unchangeable, whilst, according to Darwin, they should be perfectible. "The animals present," says O. Heer, "not only in their physical constitution, but also in their instincts, a tenacity which is decisive (against Darwinism). This inalterability proves better than anything else that their instincts are not the result of an imitation, but are innate among them, and they were given to them by the Creator. If the instinct were the result of an education, as Darwin tries to prove, it would be also perfectible, and we ought to expect, at least for the insects that are endowed with the most wonderful instincts, changes so much more rapid as their individuals have a very limited existence, and as they are subject to annual transformations." (O. Heer, *Die Urwelt der Schweiz*, pp. 751-754.)

But there is nothing of the kind. The habits of the insects, since they observe them, ought to have undergone some transformation, because those which we have to-day before our eyes are separated by a multitude of generations from the first that have been studied. However, there is no modification, no progress in their instincts. The spider weaves its web to-day in the same manner as in the time of Aristotle, and the ant heaps up provisions just as it did in the time of Salomon.

Thus, experience proves that the transformation of the essential qualities of the beings and that the passage from one species

to another are contrary to the laws of nature; it is in discord with history to prove this capital point. The Darwinists are incapable of citing one single example of a higher type that has gone forth from a lower type, of a species produced by another species. The species is "variable," but it is not "transmutable." The grain of truth contained in the system of Darwin is that the natural selection, or, to speak more correctly, the divine selection, acting through the natural laws which it has established, may produce new races. But the system is false, when, confounding the species with the race, it applies to the first what is becoming only to the second. History and science are unanimous in affirming with Genesis that there are, in both the vegetable and animal kingdoms, primitive and irreducible species. *Naturæ opus semper est species et genus*, said Linnæus; *culturæ sæpius varietas; artis et naturæ classis ac ordo*. The breeder, the gardener, may produce varieties and races; God alone creates species.

CHAPTER VIII.

HAECKEL'S MONISM.

"IN THE beginning," say the Hindoos, to explain the origin of things, "in the beginning there was the golden egg." Haeckel expresses himself, in our days, with less poetry, but not with less truth than the ancient chanter Arya, and he tells us: In the beginning was the atom, the *moner*.

Ernest Haeckel is professor of zoology at Jena, Germany. By his compatriots he was surnamed the "German Darwin." He is, indeed, a second Darwin, he is even the complement of the first. In his teaching and in his books, he defends evolution with a real passion. Thanks to his efforts and to those of some other German naturalists, mostly his followers, this doctrine has conquered more adherents in Germany than in England, where it arose. Darwin acknowledged the services which Haeckel rendered to his cause. "This naturalist, whose views are," he says, "on many points much more complete than mine, has confirmed almost all the conclusions

to which I myself have been led." (*Descent of Man*, Introduction.)

Haeckel, indeed, is more complete than Darwin. He has pushed the theory of evolution until its extreme consequences, he has reduced it into a system, he has made thereof a universal explanation of the world and of all that exists and he has opposed it to all the ancient explanations about the origin of things; finally, he has given a new name to his system and has called it *Monism*, because it reduces all to the unity, or, as he expresses himself, to the *moner*. He has explained his ideas in a great number of works, which had a real success. The two principal ones are, the *History of the Natural Creation* (*Natürliche Schöpfungsgeschichte*) and the *Anthropogeny*.* The exaggerations and the singularities which they contain have not less contributed than the talent of the author to its celebrity.

A certain number of German evolutionists, witnessing the disfavor Haeckel's exaggerations threw on their ideas, disowned him and even combated him. In fact he is the *enfant terrible* of the party, but he received nevertheless the approbation of Darwin (See A. Wigand, *Der Darwinismus*, Vol. II., pp. 81, 82,) and it is not without some right that he answers to his adversaries that he is logical, in going to the end, whilst they are inconsequent and stop half-way. The learned Englishman is full of reserve; he speaks of God, he tries to dispel the accusations of irreligion brought against his system; the professor of Jena is more frank, he throws down all masks and deducts all the conclusions contained in the premises set up by the theory of selection. Darwinism is rather a theory of natural history than a philosophical and religious system: on the contrary, Monism is above all a materialistic explanation of the origin of things. Darwin chiefly preoccupies himself with the question of the *How* and seeks the conditions of the beings; Haeckel before all wants to know the *Why* and decides the question of cause and origin. Whilst the first does not formally exclude the final causes, the second laughs at them and expressly rejects the action of an intelligent cause, acting after a determined plan, in the work of the production of beings. (See *Natürliche Schöpfungsgeschichte*.)

Hence, Haeckel is not only Darwinist, he is moreover Evolutionist, in the greatest extent of the word: he is a reformer of philosophy and of religion, in the same time as a savant. His doctrine consists

* This work is translated into eight different languages.

in admitting the theory of descent with all its consequences, that is, the eternity of matter, spontaneous generation, the primitive existence of an eternal atom from which all that now exists has descended by a series of developments and evolutions. The exposition of his system limits itself in tracing back the history of this series of progressive transformations, according to the manner he conceives them.

As to the origin of life, according to Haeckel, it had the most humble beginnings. One day, at the beginning of the geological times, undoubtedly in the Laurentian epoch, some atoms of azote, carbon, oxygen, and hydrogen agglomerated, and favored by exceptional circumstances, constituted the first and the most simple of organisms, the *moner*. The monera being imaginary beings which nobody has ever seen nor could see, not even Haeckel, are, this naturalist tells us quite seriously, "informal corpuscles of small dimension, generally microscopic beings. They are constituted of a homogenous, soft, albuminous or mucous substance, without structure, without organs; but they are nevertheless endowed with the principal vital properties. The monera move, nourish themselves, and reproduce themselves by segmentation." (See *Anthropogenie*.)

From the moner, which constitutes the first degree of the organic series, has gone forth the *amibe*, simple protoplasmic cell containing a nucleus, but endowed already with sensibility and will. Then several of these cells associated themselves to form what Haeckel calls *Synamibes*. This is the third degree of the series. Starting with the moner, from degree to degree, from evolution to evolution, Haeckel arrives until man. Twenty-two animal forms mark the principal stages run through by nature to come from the moner to man. According to Haeckel, our ancestors, after having been at first an inorganic matter, have been endowed with life by spontaneous generation. Man has been, from stage to stage, first a moner, then, always ascending, an amibe, a synamibe (*morula*), a ciliated larva (*planula*), a gastræa, an acoelomi (*turbellaria*), a scolecida, a bagged worm (*ascidia*), an acrania (*amphioxus*), the most ancient of the verebrates, a craniota (lamprey), a selachian, a dipnoi, a sozobranchia, a sozura (salamander and triton), a pretamnion, a promammal, a marsupial (opossum and kangaroo), a prosimian (maki), a menocerca (catarrhinian and semnopithecii apas), an anthropoid (resembling

the orang, gibbon, gorilla, chimpanzee, but different from these apes), a pithecanthropus or man-monkey, and finally a real man.* Therefore, we are of the same race like the monkey.

"Man certainly forms a part of the order of the catarrhinian apes of the ancient world. Surely man does not descend directly from any of the actual anthropoids. Neither the African gorilla and chimpanzee, who are black and dolichocephalous like the negroes, nor the Asiatic anthropoids, the orang, and gibbon, who are brown, or yellow-brown, and brachycephalous like the Mongolians, cannot be considered for a moment as our ancestors. . . . But if man does not descend from any of the known anthropoid apes, he has nevertheless ancestors common with the latter; he is only a spray of the branch of the catarrhinian apes of the ancient world. . . . Haeckel admits the existence, between the anthropoid and man, of men-apes still deprived of speech and of intellectual development which is derived therefrom; these pithecoïd men lived, they claim, about the end of the Tertiary age. . . . The improvement of the larynx and of the brain was the only creator of real man." (E. Haeckel, *Über die Entstehung und den Stammbaum des Menschengeschlechts*, translated by Soury (*Preuves du transformisme*), Preface of the translator.)

Huxley was the first who taught in 1863, in his book, *Evidence as to Man's Place in Nature*, that our species descends from the ape. The German evolutionist accepted this opinion and has defended it since with the fiery zeal that characterizes him. "The catarrhinian apes provided with a tail arose from prosimians through the transformation of the set of teeth and the change of the claws into nails; this probably took place from the Eocene Tertiary age. The anthropoids descended from the catarrhinian apes. . . . On account of this, the latter had to lose their tail and to get rid partially of their hair; besides their cerebral skull predominated over the facial skull. . . . These ancestors belong to the miocene period. . . . The man-ape probably lived about the Tertiary age. He comes from anthropoids through a perfect habit to the vertical stature and through a most complete differentiation of the two pairs of extremities. The anterior extremities became the hands of

* See the genealogical tree of man, in the *Anthropogenie*, pl. xi. The twenty-two stages are described in his *Natural History of Creation* pp. 573-586 and in the *Gesammelte populäre Vorträge*, Vol. I., pp. 217-228.

man, the posterior extremities became the feet. Although these men-apes were, not only by their outward conformation, but also by the development of their mental faculties, more related to real man than the anthropoids, they however were wanting of the really characteristic sign of man, the articulate language with the development of the intelligence and of consciousness which is inseparable therefrom. The existence of the primitive men deprived of speech is a fact of which every serious mind will find the proof in comparative linguistics or in comparative anatomy of language and especially in the history of the evolution of the language at the child and at each people. . . . The real men derive from anthropoids through the gradual transformation of the animal cry into articulate sounds. The development of the function of language naturally entrained that of the organs which correspond to it, that is, of the larynx and of the brain. . . . The passage of the man-ape deprived of speech to the perfect man, endowed with speech, effected itself gradually." (E. Haeckel, *Natürliche Schöpfungsgeschichte*, p. 584 ff.)

The theory of natural selection does not necessarily lead, as we have remarked already, to that of the descent, but it leads toward it by an almost insensible inclination. Charles Darwin himself seems to have given right to Haeckel and to justify his assertions. In his book *The Origin of Species*, published in 1859, the learned Englishman, either because he then drew back through timidity before such conclusions, or rather because he did not yet foresee all the consequences of his system, had not said one single word about the animal origin of man. But eleven years later, in his *Descent of Man, and Selection in Relation to Sex* (1871), encouraged by the success or gained by Haeckel, he professed the same opinions like the latter, although in a more moderate language. One year previous, in 1870, M. de Quatrefages arose with a chivalrous generosity against "the popular belief," according to which Darwin made "man the grandson of the ape." In his *Descent of Man*, Darwin "crowned the building," according to the expression of Haeckel, and expressed himself thus: "Man descends from a less perfectly organized form than himself. The bases upon which this conclusion is founded are immovable, for the intimate likeness that exists between man and the lower animals during the embryonic development, as well as in the numberless points of structure and constitu-

tion, points so much important as significant,—the rudiments which man preserves and the abnormal reversions to which he is accidentally subject,—are facts which can no longer be contested. . . . All leads in the clearest manner to the conclusion that thus man descends as well as other mammifera, from a common ancestor.” (Darwin, *La descendance de l'homme*, translated by Moulinié, Paris, 1874, pp. 419, 420).

We are therefore the children of an animal. Behold, according to Darwin, our genealogical tree: “Man descends from a woolly mammifer, provided with a tail and pointed ears, which probably lived on the trees, and inhabited the ancient world. A naturalist that would have examined the conformation of this being would have classed it among the quadrumanes as surely as the common ancestor and still more ancient than the apes of both the ancient and new world. The quadrumanes and all the higher mammifera probably descend from an ancient marsupial, itself descending, through a long line of different forms, from some being similar to a reptile or to an amphibia which, in its turn, descended from an animal similar to a fish. In the obscurity of the past, we faintly see that the ancestor of all the vertebrates must have been an aquatic animal, provided with fish-gills, having both sexes united in the same individual, and the most essential organs of the body (such as the brain and the heart) imperfectly developed. This animal appears to have resembled, more than any other known form, to the larvæ of our actual marine ascidia.” (*Opus cit.*, p. 423.)

These are in modified terms all the ideas of Haeckel on the origin of man; this is the whole theory of descent.

Darwin stopped at these affirmations in his writings. The German naturalist went further. Not content to explain our origin by the theory of descent and of evolution, he wished to explain also the origin of life and to add to the natural explanation of the formation of the species, by way of evolution, the monist philosophy which gives an account of the appearance of life and of matter itself. The monist philosophy has nothing original. It is a clear resurrection of materialistic atheism. All the new it has, are the words by which it seeks to rejuvenate its old errors. The only power of misleading it may exercise upon certain minds, is that it is adapted to quite a system of natural history which has the pretension to be at the same time a cosmological and universal system.

Haeckel has renewed the attempt of Epicurus, in modifying the system of the Greek materialist according to the modern progress of the sciences: the eternal atom explains all. From the eternal atom has gone forth all that exists; life has been communicated to the moner through spontaneous generation. The latter replaces the *clinamen* or the fillip of Epicurus, it is the *deus ex machina* of the German naturalist. Therefore he places, at the head of his system, as fundamental principles, the dogma of the eternity of matter and the theory of spontaneous generation. All that exists has gone forth from the atoms through spontaneous generation, or, to employ his language, through "autogonic plasmagony." "We understand thereby the production of an organic being without parents." (E. Haeckel.)

Such is in summary the scientific and philosophical doctrine of Haeckel. We know now all the fundamental ideas: eternity of matter; development of life through spontaneous generation; simian origin of our species; there remains for us only to appreciate them and to examine their value.

CHAPTER IX.

CRITICISM OF HAECKEL'S SYSTEM.

CARL VOGT, who is, however, "frankly Darwinist," as he himself declares, made the following remarks on the system of Haeckel: "Haeckel knows all. For him there is nothing obscure; all is proved in an evident manner. From the amorphous moner until the speaking man, all the stages are determined by induction, counted among the twenty or twenty-two and all these phases placed in the corresponding geological ages. Nothing therein is wanting. Unfortunately, this so complete and well handled genealogical tree, shows one little defect, similar to that of Roland's horse; the reality is completely wanting to it, like the life to the horse of the paladin. All the steps are erected by imaginary beings, of which one has never found any traces, but which nevertheless should be considered as entirely real, etc." (C. Vogt, *L'origine de l'homme*, in the *Revue scientifique*, May 5, 1877, pp. 1058, 1059.)

The first remark which the study of Monism suggests, is that it is not a scientific system but a philosophy of nature, quite outside

the sphere of experimental observation. It has therefore no right to assume the title of being scientific, it is a false label, a usurped name, because all that is not established by experience does not belong to the natural sciences. Haeckel himself tells us that he is unable to prove his starting point: he wants us to accept it without proofs as a necessary truth. Hence it belongs to philosophy to teach us what we should believe thereof. Consequently, we shall appeal to the principles of reason, in discussing in turn the capital propositions of the system of the new Epicurus. When needed, we also shall invoke the testimony of the natural sciences.

The basis upon which rests the whole edifice of Monism, is the eternity of matter. If the atom is not eternal, one is obliged, according to the avowal of the German naturalist himself, to admit the existence of a Creator, that is, of a God, capable to produce it, and from that moment the whole atheistic and materialistic system miserably falls to pieces. Well then! We cannot accept the eternity of matter without denying one of the essential principles of reason or rather reason itself, for it affirms that there is no effect without cause: now, if matter is eternal, then here is an effect without cause. This is the whole question. Must we, with the Monists, admit a postulatium which they themselves declare as incapable of being proved, or must we admit, with reason, that matter is an effect, and that consequently it has an author? Whoever is not blinded by the prejudices of infidelity will not hesitate to pronounce and rank himself on the side of reason against Haeckel and his followers. Savants that have no faith, like Du Bois-Reymond, have categorically done this. Listen to the language of the latter:

"The conception according to which the universe would be composed of small parts which have subsisted from all eternity and shall always subsist, and whose central forces beget all movement, is only a phantom of explanation. It reduces, indeed, . . . all the modifications of the material world to a constant sum of forces and to an equally constant mass of matter, and does not leave, consequently, anything to explain in these modifications themselves. Justly proud of this triumph of our thought, we can content ourselves for some time with the spectacle of the universe as a given grandeur, but soon we ask to penetrate more ahead and to understand the essence of this constant mass, animated by a sum of equally constant forces. It is then that we perceive that if, within certain limits, the atomis-

tic conception renders good services in the physico-mathematical analysis of the phenomena, and if even, for certain objects, it is indispensable, from the moment one goes beyond these limits one exaggerates its bearing, it entrains us into insoluble contradictions which have been at all times the reef of *corpuscular philosophy*." (*Les bornes de la philosophie naturelle*, in the *Revue scientifique*, Oct. 10, 1874, p. 339.)

If it is false that matter is eternal, it is this so much less that life could be produced in the universe by spontaneous generation. Some savants, just like common people, are too easily satisfied with words that have no sense; they cover their ignorance under an expression which hides and disguises it, and they themselves are dupes of phantoms created by their imagination. Spontaneous generation is one of the most striking examples of this dupery of words. It is the golden egg of the Hindoo poet. Formerly, they believed to say something when they spoke of the horror which nature had for the void; to-day, they laugh at this language, which indeed expresses no real idea, but one falls into the same errors on other subjects. In times of yore they attributed to spontaneous generation the production of living beings whose manner of birth they ignored, to-day Haeckel makes use of this word or analogous words to explain the origin of the monera. The history of errors on the pretended spontaneous generation is, however, very proper to show us that it is *verbum sine re*, an illusion, a phantom.

Aristotle explains the origin of all the organized beings by three ways of generation: the one are viviparous, that is, arise alive and formed; the others are oviparous or proceed from an egg; others finally are produced by spontaneous generation, that is, without parents. The description of the spontaneous generation of the bees, given by Virgil in the fourth chant of the *Georgics* is famous and well known:

" . . . *Liquefacta boum per viscera toto
Stridere apes utero et ruptis effervescere costis.*"

—*Georg.* iv., 555, 556.

The Fathers of the Church and the scholastics also believed in the spontaneous generation, and this belief was quite general until modern times. In the seventeenth century they still admitted that the corrupted meat and advanced cheese spontaneously produced the worms they found therein. Von Helmont (1577-1644) indi-

cated the proceedings one had to employ to raise frogs, leeches, scorpions, and mice; Father Kircher (1602-1680) also gave a recipe to produce scorpions; Father Buonanni (1638-1725) believed that a certain kind of wood, in rotting in the sea, produced worms which begot butterflies, which ended by transforming themselves into birds. Sebastian Münster (1489-1552) related that one finds in Scotland trees whose fruit, enveloped in the leaves, if it falls into the water in the proper season, becomes a bird called tree-bird. Aldrovandi (1527-1605) also considered the king-ducks as the product of certain trees.

To-day we laugh at all these fables, but the Haecklians ought not to do this, for they renew them in our time. The precursor of the Evolutionists, Lamarck, maintained the spontaneous generation in 1809. Pouchet took up again the question in his last years; he published on heterogeny quite a series of labors which caused a good deal of noise. There exists no other difference between the actual followers of spontaneous generation and those of former times, except this: the contemporary evolutionists try to give to their system a more scientific appearance. But in reality both support themselves only upon badly observed facts. The great defender of this opinion in our time, Pouchet, pretends that, even in the generation properly speaking, the new being spontaneously appears in the ovary, and that it remains therein, in its first phase, independent from maternal life. He tries to give several reasons in favor of generation without ascendants. His explanation of spontaneous generation reduces itself to this: it is done by means of eggs, like the ordinary generation, but with the difference that in the latter the eggs are secreted by the ovary, whilst, in the first, they are the product of a pellicle that forms itself on the surface of the infusions.

The principal proof for the existence of the spontaneous generation brought forward to-day by the heterogenists is drawn from the production of the microscopic beings which especially appear on the infusions, and which, for this motive, are called infusories. They develop themselves, in a temperature from 30 to 40 degrees C., in an infusion of any organic substances, for instance, in a pinch of hay or of moss which ferments in a liquid. They are also called microbes. They are constituted by a simple cell or by the union of identical cells, being able to live in an in-

dependent manner. There are round ones, oval, and elliptic ones; some resemble small spores, others snakes or flowers; their flesh is soft, whitish, elastic, and contractile; their thickness varies from two thousandths of a millimeter to two-tenths of a millimeter. According to their diverse forms, they give them the particular name of vibrios, bacteria, bacilli, and micrococci. The bacteria are straight and rigid like spores; the vibrios, movable and vibrating, undulate like agile snakes; the vorticellae resemble bell-shaped flowers, borne upon flexible and contractile stems; the monad is spheric; the colpoda are bulged on one side and slightly hollow on the other, like a kidney-bean; the paramecium has the form of a more or less regular almond; the stentor, that of an elongate trumpet, etc. The infusoria nourish themselves of infusoria. These microscopic animals are everywhere, in the air, in the water, in all places. The trail of dust, which a ray of the sun shows us in penetrating by the slit of a window shutter in a closed room, is, as Ehrenberg called it, "the milky road of the lower organizations"; the microscope permits to recognize therein myriads of eggs of infusories. These animalcules themselves swarm in the dust at the reflex of the rainbow, which we notice above certain stagnant waters; in rivers whose surface is hidden by lentils which cover them with a green carpet; in the clouds which they illuminate sometimes with phosphorescent glares. To believe the heterogenists, the existence of the infusories would be due to spontaneous generation, and these animalcules would thus prove the reality of this mode of production in nature. The truth is, that the infusories owe life to other pre-existing infusories, as the careful observation of the facts has proved. They multiply themselves in prodigious numbers in three ways: through eggs, like all the other animals, through scission, or finally through budding. Balbiani discovered in 1858 the eggs of the paramecia; he saw the embryos developing themselves in the body of the mother-infusory and escaping outside. They have established that the microscopic animals also reproduce themselves through scission and budding. In all these modes of reproduction, the spontaneous generation, as it can be seen, plays no rôle: there are always parents.

Decisive Experiments of MM. Pasteur and Tyndall.—The experiments attempted by Spallanzani (1729-1799) were not far from establishing that the infusories develop themselves in a liquid

only if this liquid is in communication with the air; whence it is natural to conclude that they result from germs contained in the atmosphere.

However, these first experiments were not absolutely conclusive. If Spallanzani succeeded in hindering the appearance of infusories of a higher order, all these precautions failed in regard to animalcules of an extreme smallness. It needed the intervention of M. Pasteur to solve definitely the question (1822-1899).

The experiments of M. Pasteur have established in a rigorous manner that the microbes are always derived from living germs, produced anteriorly by similar organisms. To hinder them from developing themselves in an organic infusion, it is sufficient to raise it to a temperature of 115 to 120 degrees. This temperature kills the germs and no microbe appears. There where there are no eggs of infusories, no animalcules produce themselves. They abound in low and damp places; they diminish on the mountains, where the air is purer in the measure one rises. The amianthus reduced to hair and employed as a filter through which one makes the air pass is charged with eggs of infusories; if one bring it near the fire, the fire destroys the germs and the infusories no longer produce themselves. In an infusion heated until boiling, the germs do not manifest themselves any more. Therefore, they certainly come from the air which serves to them as vehicle; hence there is no spontaneous generation. Only one must be careful, in his experiments, that the living infusories sometimes in a state of lethargy, if one dissects them during this period of numbness, a temperature of 130 degrees might be insufficient to kill them, whilst in the damp state a temperature of 50 degrees is sufficient to cause them to perish.

The experiments of Mr. Tyndall, a learned English materialist (died 1893), have confirmed those of Pasteur and established by other means that there is production of infusories only there where pre-existing germs are existing in the air. The proceedings which he employed are various; they mostly reduce themselves to purify the air from all foreign bodies, without filtering it, like M. Pasteur did. Listen to one of his experiments and the proof which he draws therefrom for the existence of germs in the air. We follow step by step his account and reasoning.

"One puts," he said, "in your hand a granulated powder and one asks you to tell what this is. After having examined it, you sup-

pose, right or wrong, that it is a mixture of seeds or spores of diverse vegetable species. To assure yourself thereof, you prepare a plat-band in your garden and then sow your dust therein. Soon afterward you will see therein the sprouting of rhubarb and spike. You repeat the experiment in other layers, once, twice, ten times, fifty times, you obtain the same result; what conclusions will you draw from this? You will say: I cannot affirm whether every grain of this dust is a grain of rhubarb and spike; but I can affirm that the grains of rhubarb and spike form a part of the dust. There exists in physics no surer experiment than this. Now let us suppose that the dust is light enough to float in the air and that you can see it as distinctly as the heaviest powder contained in the hollow of the hand. If the powder, sowed through the air instead of being sowed by hand, definitely produces a living crop, we certainly can conclude with the same rigor that the germs of this crop should exist in the powder. Let us take an example: the grains of the small plant, called *penicillium glaucum*, are light enough to float in the air. An apple cut, a pear, a tomato, a slice of vegetable marrow, or an old moldy boot, a plate of paste, a pot of preserves, constitute a very becoming soil to make the *penicillium* grow. This posed, if one can establish that the dust of the air, when it is sowed in the soil, produces the *penicillium*, whereas, if the dust is wanting, neither the air nor the soil, nor both united, can produce this plant, we would have the right to conclude from this that the floating dust contains germs of *penicillium*, like the powder sowed in the garden contained germs of rhubarb and spike."

The difficulty is to render the floating matter visible. M. Tyndall solved this difficulty as follows: he prepared a small chamber, provided with a door, windows, and shutters, and he fixed in one of the slats an opening through which the rays of the sun could pass; then he closed the door and windows so that only one ray of light could enter through the hole of the shutter. After this, the following phenomena could be noticed: "the trace of the sun's ray is at first clear and alive in the air of the chamber, the luminous trace becomes weaker and weaker, then it ends by disappearing completely and no trace of the ray can be seen any more. What is the explanation thereof? What rendered the ray visible in the first place? It was the floating dust in the air; thus lighted and observed, it became as palpable to our senses as all other dust placed in the hollow of the

hand. But in the quiet air, the dust falls by and by on the soil, or attaches itself on walls and ceilings, until finally, by this proceeding of automatic cleaning, the air becomes entirely disengaged from the dust which it mechanically contained in suspension."

This first point established, M. Tyndall pursued his experiments. "Let us cut into pieces," he says, "a beefsteak, and leave them during two or three days in the warm air; thus we extract beef juice into a concentrated state. By boiling and filtering the liquid, we can obtain a perfectly transparent beef tea. Let us expose several vessels containing this tea to the air of our chamber free from matters in suspension, and let us expose a certain number of other similar vessels, containing this same liquid, to an air charged with dust. At the end of three days, each of these vessels of the second group will have a bad odor, and, if we examine it by means of the microscope, one will notice therein a swarm of those bacteria, which we find in matters in a state of putrefaction; on the contrary, the beef tea contained in the chamber preserves itself without corruption; at the end of three months, of three years, it is always clear and of good taste, as free from bacteria as it was in the first moment. There is, however, no essential difference between the inner and outside air, but the one is without dust and the other charged with dust." Not content with this first trial, M. Tyndall continues the experiment in the following manner: He opens the door of the closed chamber and permits the dust to enter. At the end of three days, each of the vessels which it contains swarms with bacteria in a state of active putrefaction. What results from all these facts? Here again, says the English savant, the conclusion is as certain as in the case of the powder sowed in the garden. "In the presence of similar facts," he concludes, "it would be monstrous to affirm that these swarms of bacteria were begotten in a spontaneous manner." (*Mémoires*, de MM. Tyndall et Pasteur, published by the Abbé Moigno, Paris, 1878, pp. 19-22.)

The experiments we have reported are conclusive. They have driven from its last retrenchments the theory of spontaneous generation, and it seems that it is no longer possible to defend it. But of what is not the partisan spirit capable? Monism cannot do without spontaneous generation; therefore it adheres to spontaneous generation. Not that Haeckel pretends to question the results obtained by the savants we have cited: they are too evident

and too decisive to be contested; but, by a very strange language in the mouth of a naturalist, he pretends that what has not been established until now may be this in future. Although natural history is an experimental science, although it has no right to affirm anything except what it has verified by experience, the professor of Jena nevertheless affirms the existence of spontaneous generation in natural history, in spite of the testimony contrary to experience.

The first appearance of the moner is for Haeckel the proof of the reality of spontaneous generation. But the moner, this living, informal organism without organs, produced through a simple chemical combination of inorganic elements, this moner has been imagined by Haeckel; it does not exist and never did exist. The most simple organisms known to us are not at all informal and without structure; they already present a sufficiently complicated organization, as, for instance, the plasmodia of myxomycetes, as it goes forth from the inquiries of De Bary, Hofmeister, and other naturalists. Even the protoplasms of the most elevated cells present a defined differentiation of solid and liquid under the form of ramifications of a fluid mucosity, of small voids, etc. The amibes, which, according to Haeckel, are monera, possess not only a nucleus and a contractile vesicle, but produce in this nucleus small germinative grains and in particular capsules spores which very probably indicate a sexual differentiation. (Greef, *Verhandl. des naturhist. Vereins der Rheinlande*, xxvii., Sitzungsber, p. 200.) Even the most simple of the monera, the *Protamoeba primitiva*, which Haeckel presents to us as homogeneous and without nucleus — although the existence without nucleus is denied by other naturalists, — the *Protamoeba primitiva*, to judge from Haeckel's own design thereof, is not homogeneous: it is a granulous substance, which is thicker in the center. (Wigand, *Der Darwinismus*, Vol. II., p. 456.)

It is true that Haeckel cites the *Bathybius* as a moner produced by spontaneous generation. This *Bathybius* plays an important rôle in the history of monism, and has to stop us for a few moments. Haeckel calls it "the most remarkable perhaps of all the monera." The famous zoologist Huxley discovered it in 1868 and called it in honor of the German evolutionist *Bathybius Haeckelii*. *Bathybius* signifies "that what lives at great depths," because this "pro-

toplasm" was found in the ocean at depths of twelve thousand and even twenty-four thousand feet. Gmbel of Munich went perhaps still further, for he pretended that this substance is found not only in the slime of deep seas, as Huxley and Haeckel claimed, but in all the seas and at all the depths.

In their turn, the geologists authorized themselves with this discovery to affirm stronger than ever the animality of the *Eozoon canadense*, a small fossil which they claimed of having found in the Laurentian limestone of Canada, *i. e.*, in the most ancient of sedimentary grounds, and whose organization is disputed like the pretended Bathybius.

The triumph of the evolutionists upon this ground was of short duration. We know that, about 1875, the English government intrusted to a committee of learned naturalists the care to explore scientifically the seas with the help of dredges and soundings. This campaign, executed on board of the *Challenger*, did not last less than three years and has remained famous in the annals of science. The savants who undertook it believed, on the faith of Huxley and Haeckel, in the existence of the Bathybius; one of them, John Murray, tells us this in an express manner. It was not through their fault when they came to establish the error of the first experimenters. Great was their surprise, during the first year, to discover nothing that reminded of the Bathybius. But, behold, on some lucky day they recognized the much looked-for substance in the water of the sea, and which they forthwith preserved in alcohol. But, what an unfortunate thing! The being which they had taken for a living and animate being was nothing but a common chemical precipitate of sulphate of chalk. Repeated experiments proved this: it produced itself when the sea water was mixed with an excess of alcohol; a necessary condition that the sulphate of chalk, always contained in sea water, may partially become insoluble. As to the movements noticed in the substance subject to the examination of Huxley, they are without any importance in our question; for we know, from a long time, that matter, divided into exceedingly small particles, often shows in the liquid, wherein it can be observed with a powerful microscope, a mobility which may, at first sight, cause the illusion. This is what is called the *Brownian* movement, from the name of the savant who first noticed it when studying the cavities contained in the crystals of quartz.

The control of the naturalists of the *Challenger* has, therefore, been fatal to the Bathybius. They submitted to Huxley himself the precipitate contained in the alcohol, and, in his turn, had to acknowledge its identity with the matter which he had believed to be alive. His undeceiving was complete. According to his own expression, he declared himself ready "to swallow the pill." He had been deceived, he added, by the very excess of the precautions he had taken to remove the error. It had been his request that all slimy specimen drawn from the sea should be placed right away into a flask filled with concentrated alcohol and sent to his laboratory. Unconsciously, he took the necessary precautions to obtain the precipitate of the sulphate of chalk.

After these experiments, it appeared as if it was done with the Bathybius. Haeckel, who had been witness thereof, had to swallow his part of the pill. To the greatest astonishment, in August, 1879, the president of the Britannic Association assembled at Scheffeld, M. Allman, renewed the legend of the Bathybius and congratulated Huxley for his discovery.

We can easily understand the embarrassment of the latter, who was just expected to answer to the president. Huxley drew himself out of the affair with great tactics. Let us quote textually his own words: "Our president," he said, "has alluded to a certain . . . thing,—indeed, I do not know what to call it, if I have to call it something (*laughter*),—before you it was called *Bathybius*, indicating, which is perfectly exact, that it was me who caused it to be known; at least it was me who had baptized it (*new laughter*), and, in a certain sense, I am his most ancient friend (*great laughter*). Some time after this interesting Bathybius had been launched into the world, a number of curious persons took the little thing by the hand and made a great affair about it (*laughter*). And, as the president had the kindness to tell you, these persons repeated and confirmed all the statements which I had rashly made in regard to the subject. Things, therefore, went on smoothly, and I was under the belief that my young friend Bathybius would do me great honor (*new laughter*). But I am sorry to say that, with the time, he did not keep at all the promises of his young age (*great laughter*). In the first place, they never succeeded to find him there where we might expect his presence, which was bad enough (*laughter*);

but the worst was, that, when they met him, all kinds of stories could be heard at his expense. Indeed, I regret of being obliged to tell you that some persons went that far as to maintain that it was nothing else but a gelatinous precipitate of sulphate of chalk, that had dragged along in its fall some organic matter (*laughter*). If it is thus, I am very sorry, for if others have shared this error, it was me, who, without the least doubt, should bear the first responsibility. But, at present, I do not know myself what it is."

One might have desired that M. Huxley should have confessed his error more frankly; but thereby he would have humiliated himself, and perhaps also would have humiliated the president whom he was charged to compliment. However, as M. de Lapparent remarked in a note in regard to this subject (*Revue des questions scientifiques*, Jan., 1880), "for all those who know to read between the lines, it will clearly appear that the learned professor is no longer deceived about the lot of his ancient client, and that, if he had to make a speech on the natural rôle of the protoplasm, he was very careful not to appeal to the Bathybius in support of his thesis."

Those who have yet some doubt in regard to the Bathybius only need to read, in the *Revue des questions scientifiques* (Jan., 1880), a letter of John Murray, who does once more full justice, and from which it goes forth that his godfathers, Huxley and Haeckel, have decidedly abandoned him.

Hence the theory of spontaneous generation cannot allege in its favor the existence of the pretended Bathybius: it rests upon no proof; it is in formal contradiction with all the accounts of experience. It is the stumbling block of monism. Du Bois-Reymond truly says, when placing at the head of what he calls the "seven enigmas of the world," the essence of matter and of force, and the origin of movement, he declares that these are "transcendental" things, that is, inexplicable for science. "When it is not becoming to us to admit a supernatural origin of the movement," he says, "we have no means to explain the first movement of matter. Undoubtedly, we can imagine it as being in movement from all eternity, but thereby we renounce of rendering an account of this phenomenon." (*Die sieben Welträthsel Deutsche Rundschau*, Sept., 1881, p. 358.) The notion of the creation alone can explain to us the origin of movement, life, and matter.

If monism is powerless to explain the origin of the world and of life, it is this not less to establish the filiation of the species and the animal origin of man. We have seen already, in the criticism of Darwinism, that it is not scientifically proved that one single species is derived from another by way of generation and evolution. According to evolutionism, one species rises from another through a gradual and insensible transformation of the type, and through an accumulation of variations, at first very small and almost imperceptible, which in the long run constitute quite different beings, and make, in the series of centuries, to go forth from the primitive moner, the actual man with his different races. But Haeckel and his followers do not bring forward one single and direct proof in support of their assertions. They limit themselves to accumulate hypotheses upon hypotheses. They construct a scaffold, in their imagination, but do not give it a solid and real foundation.

Robinet, who among the savants has such a bad reputation, has also maintained, in the eighteenth century, that all matter is alive; that the so-called brute bodies are alive like the organized beings; that there is in reality only one kingdom in nature, the animal kingdom; and that the most perfect animals are only the imperfect animals, disengaged from their primitive imperfection through a series of successive metamorphoses. Robinet, to prove the metamorphoses of the being, which, from mineral has become man, wrote his *Philosophical considerations of the natural gradation or the attempts of nature which teaches how to make man*; he reunited therein stone specimens, which he caused to be designed, and which imitate the heart of man, the skull, the brain, the jaw, the feet, the eyes, the ears, the hands, etc. After having shown us these specimens, he believes that his demonstration is made. Haeckel and his followers have no longer recourse to these childish reasons, but in reality their arguments are not better founded.

THE RELATIONSHIP BETWEEN MAN AND THE APE.—With much more reason is Haeckel unable to prove in a scientific manner the relationship between man and the ape. The partisans of the man-ape are forced to admit that there exists no species of quadrumanes, living or fossil, from which man can descend. Carl Vogt acknowledged as true the assertions of Messrs. Schröder, van der Kolb and Vrolik: "We know no species of apes," they

say, "constituting a form of transition between the ape and man. If one absolutely wishes to make man to derive from the ape, we have to look for the head at these little apes which group around the sajous and ouistitis, for the hand at the chimpanzee, for the skeleton at the siamang, for the brain at the orang (I would add, for the feet at the gorilla). It is evident that, abstraction made of the difference of the teeth, the general aspect of the skull of a sajou, of an ouistiti, and of some other neighboring species resembles in miniature much more the human skull than that of a gorilla, of an orang, or of a grown up chimpanzee. The wrist of the chimpanzee (and of the gorilla) has the same number of bones as that of man, whilst the orang distinguishes itself by the peculiar intermediary bone which we find in all the other apes; the skeleton of the siamang resembles by its sternum, by the form of its pectoral casing, by its ribs and basin, much more to man than the gorilla, the orang or chimpanzee; and our inquiries have proved to us that the brain of the orang comes much nearer to that of man than that of the chimpanzee. Therefore, we would have to look for the human characteristics among five different apes, of which one is in America, two in Africa, one at Borneo, and one at Sumatra." (*Leçons sur l'homme*, translated by Moulinié, 2d edit., 1878, pp. 630, 631.)

One of the teachers of evolution, Mr. Wallace, who explains the appearance of man by "an unknown cause" does not hesitate to avow as follows: "It is perfectly certain," he says, "that the natural selection cannot have drawn from an ancestor covered with hair the naked body of actual man, for a similar modification, far from being useful, would be hurtful, at least in certain regards." (In A. de Quatrefages, *Unité de l'espèce humaine*, p. 87.) In what manner and by what means did this change take place? The evolutionists are obliged to acknowledge that they have found no experimental proof or fact to bring forward in favor of the passage of the animal state to the human state. "Until at present," says Darwin, "they have not discovered the intermediary links." (*Descent of Man*, French translation i., p. 204.) No intermediary being fills up the gap that separates man from the troglodyte (anthropomorphous ape); to deny the existence of this abyss, would be as blamable as absurd. (Th. Huxley, *Man's Place in Nature*, French translation by Dally, 1868, p. 239.) I have met in Swit-

zerland, at Bienne, at Grange, and at Soleure, skulls dating probably from the first times of Christianity (5th and 6th centuries) whose forms approach much more those of Engis (that is, presently the same type as those of the prehistoric times). (C. Vogt, *Leçons sur l'homme*, 1878, p. 394.)

However, if that what the Haeckelians affirm had taken place, we would find traces thereof, and what produced itself formerly would produce itself still in our time, because the laws of nature are always the same. One of the precursors of the modern partisans of the man-ape, the famous Vanini, could not help to make to himself the following objection in his *Dialogues*. He answers under the name of Julius Cæsar, to Alexander, who personifies the professor of theology of the old Sorbonne:

Alexander.—Tell me, if possible, how the first man was formed.

Julius Cæsar.—Diodor of Sicily made the first man rise by chance, and from the slime of the earth.

Alexander.—But if this is the case, whence does it come that since five thousand years that the world is formed, according to this atheist, no man has arisen in the same manner?—He is not the only one that accepted this story for a truth. . . . Jerome Cardan appears to have held this view. "For," says he, "if not only the small animals arise from putrefaction, but also the greatest, we can affirm the same of all the mice and rats, and of the fishes, which rise by chance in the new waters."—Good reasoning of Cardan! A mouse may rise from putrefaction, therefore, man can also rise from this.—This is a supposition on his part. When putrefaction has formed itself, the fat part separates itself from the dust, and rightaway the heat gives a proper soul to this matter.—Are these heaps of filth and slime wanting to-day? Why do we not see an ox or a horse going forth from them?—However, we have to tell that Diodor of Sicily reports that in a certain place of the Nile, where the river overflows and forms a mud bed, animals of an extraordinary size go forth from it, as soon as it is heated by the rays of the sun.—I cannot subscribe to this lie.—Others have dreamed that the first man arose from the putrefaction of several corpses of apes, of porks and of frogs, for between the flesh and the habits of these animals and those of men, there is a great resemblance. However, some more manageable atheists give only to the Ethiopians the apes for ancestors, because they have

skin of the same color.—I am astonished when seeing man and his majestic bearing, one refuses to acknowledge in him a being infinitely superior to the other animals.—The atheists cry out that the first man marched bent down and on four paws like the beasts, and that only through efforts one arrives to change this manner of walking, which recommences to assume its rights in old age.—I would like to see an experience of this nature, and whether a newborn child, raised in a forest, would march like a brute or on two feet." (*Oeuvres philosophiques*, translation by Rousselot, 1842, pp. 213-215.)

Nihil novum sub sole, says Ecclesiastes. In the language of Julius Cæsar Vanini we have the opinions and reasoning of Haeckel. They undoubtedly make more roundabout ways to-day to make man descend from the ape, but they do not answer any better to the reasons of Alexander. In the impotency in which they are to produce positive proofs, they appeal to the unknown. When De Maillet explained how the flying fishes had become birds, because "the desire of prey or fear of death," having carried them away too far, they had fallen "a few feet from the shore," or, "their fins being no longer bathed by the sea water, became split . . . on account of the dryness, and their skin became covered with down (De Maillet, *Telliamed or Entertainments of a Hindoo Philosopher with a French Missionary on the Diminution of the Sea*," Amsterdam, 1748, Vol. II., p. 139, 140), he acknowledged that no savant, neither him nor anybody else, had proved the reality of these metamorphoses, but he gave for reason that they took place only in the neighborhood of the poles and in desert localities, where they were witnessed by nobody. (*Ibid.*, p. 197.) The actual evolutionists speak the same language. You ask them: where are those intermediary beings that unite man with the ape? Look for them, they answer; we cannot show them to you; they are at the bottom of the ocean. And this appeal to the unknown, they decorate it with the name of science! As if science should not have had for basis well established facts!

"Darwin and his disciples go that far as to consider as proved in their favor, the very ignorance in which we are in regard to certain phenomena. They often have combated them in the name of paleontology by asking them to prove a single one of those series which should according to them connect the parent species with its descendants. They acknowledge of being incapable of doing this;

but answer that the extinguished faunas and floras have left very few remnants; that we know extremely little about those ancient archives; that the facts attesting in favor of their doctrine are undoubtedly buried under the waves with the submerged continents, etc. 'This manner of seeing,' concludes Darwin, 'greatly attenuates the difficulties.' But, we ask again, in what branch of the human knowledges, aside of these obscure questions, would one regard the problems as solved, precisely because we know nothing of all that we ought to know to solve them." (A. de Quatrefages, *L'Espèce humaine*, 6th edit., 1880, p. 74.)

No Passage Is Possible from Any Simian Species to That of Man.—Moreover, the evolutionists cannot enjoy in the present question, even the benefit of the unknown and unattainable. If they believe to oblige us to admit that the man-ape *may* exist in the fossil state at the bottom of the ocean, they are deceived. We are assured that there is nothing of the kind, because there is no passage possible from any simian species to that of man. Proofs are abounding.

The Law of Permanent Characterization.—And in the first place, in the theory of evolution, the transformations do not take place in an arbitrary manner, according to the caprices of chance. If once the organism has modified itself, it preserves its type and the permanent imprint of the original type. This is what Darwin calls "the law of permanent characterization." Well then! in virtue of this law, man cannot descend from an ape, because all the species of apes, without exception, present with the different human races, from the view of the type, not only diversities, but a very marked opposition. Although the organs that constitute both almost correspond term for term, they are disposed after quite a different plan.

Man and the Beast.—*Man Is a Pedestrian, the Ape Is a Climber.*—Man is made to walk, the ape is made to climb. This truth is proved by the most competent savants: "Of all the beings of creation, man alone is organized for the vertical stature, he alone naturally walks erect: this is an essential character which neatly separates man from all the animals. The vertical stature at man results from the special conformation of the skeleton, from the established equilibrium, not only in the muscles, but also in the weight of the different splanchnic organs." (A. Godron, *De l'espèce et des races*, Vol. II., p. 173.) "Man is essentially a walking animal, a walker on

its hind members; all the apes, on the contrary, are climbing animals. In both groups, the whole locomotory apparatus bears the imprint of their different destinations: both types are perfectly distinct." (A. de Quatrefages, *Rapport sur les progrès de l'anthropologie*, 1867, p. 244.) "The manner in which the head is joined with the dorsal column obliges man to keep himself erect; whilst at the ape this articulation is such that he is obliged to throw back his head, when he is erect, in order to maintain the imperfect equilibrium of his body; also I have often remarked that the gorilla can keep himself only for a very short time in the vertical attitude. . . . This difference is organic; it is not derived from the force of habit, but it is the forced consequence of the organic structure. The whole human frame attests that man was created to keep himself erect, and his superior members, contrary in the quadrumanes, are of no use for him in the act of locomotion." (P. du Chaillu, *Voyages et adventures dan l'Afrique équatoriale*, Paris, 1863, p. 424.)

Man cannot, therefore, descend from an ape; a *walking* animal cannot derive from a *climbing* animal. To serve as intermediary between both, Haeckel imagined what is called the *pithecoïd* man; but of the existence of the pithecoïd man, he has absolutely no proof nor any indication, no more than of the *sozoures*, equally invented by Haeckel for the need of the cause. "The proof for their existence," says the German professor, "goes forth from the *necessity* of this intermediary type between the 13th and 15th degree." The relationship of man and the ape rests, therefore, upon purely imaginary hypotheses, whilst the differences that exist between both are very real facts.

The Ape Is a Quadrumane.—The diversity of type we have established extends itself to a number of details. The ape, for instance, is a quadrumane; man is this not. "The great toe," says Owen, "furnishing a point of support, either to keep himself erect, or to walk, is perhaps the most peculiar characteristic of the human structure; it is the characteristic which forms the difference of the foot and of the hand, and which forms the seal to his bimanous order. . . . At the chimpanzee, like at the gorilla, this toe does not go beyond the first phalanx of the second finger; but it is larger and stronger at the gorilla than at the chimpanzee. In both it is a real thumb, removed from the other fingers, from which it is removed at the gorilla so as to form an angle of 60 degrees with the

axis of the foot." (Owen, *On the Classification and Geographical Distribution of the Mammalia*, London, 1859, p. 83.)

The ape and the ape alone is, therefore, really quadrumane. "From the moment one places the essential characteristic of the hand into the existence of the thumb, the posterior extremity of the gorilla is necessarily a hand." (Alix, *Recherches*, etc.)

The Brain of Man and That of the Ape.—The brain of man also differs from that of the ape, as Gratiolet has proved. He says: "The study of the brain of the microcephalous has furnished me other elements with the help of which the absolute distinction of man is evidently and anatomically proved. By carefully comparing the brain of the apes with that of men, I recognized that in the adult age the mode of arrangement of the cerebral folds is the same in both groups; and if we would stop here, there would be no sufficient motive to separate man from the animal in general. But the study of the development obliges to make an absolute distinction between them. In fact, the temporo-sphenoidal circumvolutions appear the first in the brain of the apes and finish by the frontal lobe; now, it is precisely the contrary that takes place in man: the frontal circumvolutions appear the first, the temporo-sphenoidal designate themselves the last; thus the same series is repeated here from *a* to *z*, there from *z* to *a*. From this very rigorously established fact, a necessary consequence goes forth: no decree of development could render the human brain more similar to that of the apes than it is in the adult age; far from this, it will differ so much more from this the less it is developed." (*Memoire, sur la microcephalie*, in the *Mémoires de la Société d'anthropologie*, Vol. I., 1860, pp. 64, 65.)

If the analogous conformation of the brain of the human and simian skeleton does not prove the relationship of man and of the ape, with much more reason can this relationship not be proved by accidental and fortuitous resemblances. Does Mr. Haeckel speak seriously and as a savant when he cries out: "At certain apes, the most characteristic part of the human face, the nose, exactly develops itself like at man. The latter case can be noticed especially at the nasal semnopithecus of Borneo, whose greatly bent eagle-nose might be an object of envy for many a man poorly endowed under this aspect. If one desires to compare the face of this nasal ape with the nose of the most anthropoid man (for instance of the famous Miss Julia Pastrana), the first will appear in comparison with the other, to

belong to a much more developed type. Now, we are aware that, for many men, it is justly in the feature of the face of which we speak that *the image of God* betrays itself with a brightness impossible to disown. If the nasal ape shares this singular opinion, we have a greater right to claim for him the divine relationship than a man has with a flat nose." (E. Haeckel, *Anthropogenie*, p. 234.)

Mr. Renooz furnished the refutation of Haeckel. He says: "Haeckel's figure represents a vegetable head which, evidently, refers to mankind. In order to set off the evidence thereof, I place it aside of the skull of a man. The face is also flattened like that of all men actually living upon earth, and although the chin may be quite developed, it resembles in nothing the salient muzzle of the ape. Therefore, we have to renounce of seeking in the simian kind the origin of man, because there are existing vegetables that are *more men* than the ape." (C. M. Renooz, *L'Origine des animaux*, 1883, p. 119.)

The ensemble of the characteristics that distinguish man, anatomically and physically, from the ape and all higher animals are about uncontested; but, considered in themselves, they serve at the most, in the eyes of certain savants, to constitute "a *family*, the first in the *order* of the primates, the first in the class of the mammifera" (Topindard); it is therefore not there what we are seeking. In speaking of God's image, the very learned Homalius d'Halloy says: "The Bible could not make allusion to the material and corruptible part of man, but to his spiritual part endowed with immortality. . . ."

Reason and Liberty.—Two faculties, primordial and irreducible, *reason* and *liberty*, constitute between man and the animal an essential difference, an absolutely insurmountable bar by way of progressive evolution, an "abyss." The existence, the properties, the nature of these faculties peculiar to man are proved by a series of facts, themselves established through observation, rigorously determined according to a method and with a certitude that yields in nothing to scientific method and to certitude. Every phenomenon requires a proportionate cause; the nature of the phenomenon infallibly reveals the nature of the power that produces it. Such is the double principle, absolutely incontestable, that will serve as basis to the scientific determinism.

To avoid all confusion in language, let us first distinguish the intelligence from reason. Let us admit, if you wish, that the intelligence is the general faculty to know, and that it comprises the different species of knowledge: the sensible knowledge as well as the reflective or rational knowledge. Thus we can admit the formula, little rigorous in itself and too commonly employed, "The intelligence of the animals." There are at the animal phenomena of sensible knowledge which offer appearances, but appearances only, of superior knowledge.

Reason is the power to abstract, to generalize, to invent; the power to attain and to seize the principles, the first and necessary truths, the immaterial realities: the being, the cause, the simplicity, the unity, the plurality, the true, the good, the beautiful, space, the infinite and absolute. Reason is an element, an essential condition of liberty, of responsibility, of spirituality and of immortality; it cannot be reduced, through analysis, to other faculties; it cannot be conceived as a synthesis or as a resultant of inferior powers, still less as a function of purely material organs. Such is *reason*, the principle of intellectual knowledge peculiar to man.

The sensible knowledge common to both man and the animal has for object the particular, the singular, the concrete: that object, that individual, that pleasure, that want, that pain. It comprises the remembrance of sensible things, the faculty to retain, to recall to mind, to associate the exterior impressions; it is sufficient to explain all the facts attributed to what we call the intelligence of the animals.

Montaigne had already said that there is more difference between such or such a man than between such a man or such a beast, and Bossuet could not help "pitying such a beautiful mind, may he seriously tell such a ridiculous thing, or may he laugh about such a serious matter." The evolutionary anthropology took hold of Montaigne's word, and repeats it to satiety. They take the fossil man of the first Quaternary times, such as they suppose him; the savage man, such as they believe to know him; they compare him with the animals that appear the most intelligent, and they dogmatically conclude that, even from the point of view of reason, of the power to reflect, there is a greater distance from the man of genius to the savage thus disinherited than from this savage to the gorilla or the chimpanzee.

They forget two things: the one, that men being of the same nature, "the perfection of the human soul must be considered in all the capacity in which the species can extend itself"; the other, that the most stupid men—we shall prove this very soon—have things of a superior order than the most perfect animals. But let us admit that there exists a savage man so degraded that reason reveals no trace. This would be a purely accidental state and would affect in nothing his human nature. His reason is irremediably atrophied, annihilated through want of culture or usage, but it exists entirely as faculty. What proves this, is that at the descendant of the fossil man, in the son of the savage man, there is the civilized man, and there may be in him a man of genius. At the animal and at the descendant of the animal, in spite of all culture, the uniformity is absolute; reason which reflects, generalizes, invents, progresses, is always and essentially null. Therefore, between man, whoever he may be, and the beast, whatever it may be, there is a relation of any quantity to zero, that is, an insurmountable abyss.

The *second faculty*, equally irreducible, which establishes between man and the animal a difference of nature, is liberty. "From the principle of reflection which acts in us," says Bossuet, "arises a new principle of *liberty*. The soul elevated through reason above corporal objects is not dragged along by their impressions, and remains free and mistress of the objects and of itself. Thus it attaches itself to whatever it pleases and considers what it desires, in order to make use thereof according to the ends it has proposed to itself." (*De la connaissance de Dieu et de soi-même*, ch. v. 9.)

The philosophical thesis of liberty, so falsely interpreted, so unfortunately disfigured in our days, even by the most distinguished minds, does not enter our program. Here as much as ever we try to approach as much as possible the proceedings of experimental physiology and psychology, or, if you wish, of the *psycho-physics*. Let us, therefore, carefully examine the compared play of the "reflex actions," at both the animal and man; we will discover therein all the elements necessary to an experimental demonstration of liberty, characteristic of the human species.

At both man and the animal, every impression received through the organs of the senses transmits itself to the brain, and provokes a "reflex action," that is, a reaction proportioned to the direct action. Man alone, endowed with a free will, has the

power to interrupt and modify the reflex transmission of an impressional movement, the natural effects of a cerebral vibration. He does not undergo, like the atom, the mechanical action, or, like the animal, the physiological and fatal action. Undoubtedly, he does not annihilate the force put into play, but directs it, turns it away and retains it; he can even transform it, he can reverse the steam, like the engineer of a locomotive; to the cerebral vibration, naturally destined to provoke pain or anger, he can answer and answers, indeed, sometimes by a contrary expression, by disdain, by indifference, by joy or by laughing. The testimony of the facts add themselves here to the testimony of conscience; under the knife of the vivisector the animal cannot help manifesting outsidely the sufferings it endures; man, the most degraded, the savage scalped alive by his enemy dissimulates his torments, insults his torturer by an apparent impassibility, and seems to defy the pain.

Language.—Because these transmissions of the nervous and cerebral movement necessarily produce themselves in a fatal manner at the animal, it cannot have a conventional language, which supposes, as essential condition, the power to discern and to dominate the impressional movement. The reasonable and free man can do what the beast cannot do; his reason and liberty are here in full evidence, they explain the faculty which he alone possesses to create the artificial language of which we are going to speak, an arbitrary language which offers no natural relation between the sign and the thing signified.

The two master and fundamental faculties, characteristics of the human soul, reason and liberty, are rendered still more manifest by a number of facts, interior and exterior operations, directly observable, rigorously and universally established, which are derived therefrom and which lead to the scientific determination of the human kingdom.

This ensemble of phenomena and of faculties comprises — *the conventional language*: the mimic, the word, the writing; — *the faculty to invent, to progress, the perfectibility*; — *the perception of the moral good and evil, the moral conscience*; — *the perception of the beautiful, the æsthetic faculty*; — *the perception of the divine, the idea of God and all that has reference to God*. We shall insist somewhat more on the *first two orders of phenomena*, because they are more easily seizable by the ordinary proceedings of the sciences of observation.

It is with language as with intelligence; we generally say: the language of the animals, as we say: the intelligence of the animals. Also, as we have distinguished the sensible knowledge from the rational knowledge, we have to distinguish, quite first, the natural language common to both man and animal, expression of instinct, from the artificial language, peculiar to man, and an expression of reason.

The language of the animals is purely emotional; it solely and directly expresses a sensation, a sentiment;—the language peculiar to man is rational; it expresses the sensation, the sentiment and, moreover, the thought. Savants acknowledge that the power to abstract and to generalize constitutes a condition necessary for the conventional language, and that human reason alone possesses this power. The human language is absolutely inexplicable without the universal ideas, and it supposes liberty.

The animal, when it manifests its impressions, does not manifest them freely;—man, who expresses his thought, hears its manifestation, and he knows that he manifests it.

There exists a natural, necessary, and infallible relation between the language of the animal and the thing expressed; the beast is physiologically and absolutely incapable to lie; at man alone, as we have seen, the free will can modify the reflex action, the vibrations of the brain or of the nerves, and, consequently, their exterior manifestation; he can express thoughts, different sentiments or even opposite to those which he approves. In this, let us say it again, really consists the faculty which he alone possesses to create conventional languages. The anatomic or physical power to articulate sounds is only a secondary condition, concerning a particular kind of language, the word.

On account of this because it is natural, instinctive, and innate, the language of the animal does not perfect itself, does not progress, nor change; it is invariably the same for each species, everywhere and always, in space and in time. The artificial language being the result of a free convention is always perfectible, essentially variable, for the forms of human language are numberless; this is perhaps its most striking character.

These theoretical considerations support themselves upon facts as eloquent as unobjectionable. In his latest and very conscientious studies of anthropology (*Hommes fossiles et hommes sauvages*,

Paris, 1884), M. de Quatrefages dwelled, with a marked predilection, on a black race which seems to have more than any other "a right to the interest of the men of science and to the sympathies of all"; it exists no longer; its last representative died in 1877. We mean the *Tasmanian* race, which inhabited the Van Diemen's land. The Tasmanians were always placed on the lowest degree of the human ladder. "By their characters, among the living," says Topinard, "they are inferior even to the Australians." According to Sir John Lubbock, "hardly did the travelers consider them as beings endowed with reason." M. de Quatrefages makes us better acquainted with them; and precisely on account of their reputation of relative inferiority we call upon them as witness in the grave questions that occupy us. In order to seize better the difference of nature that separates the animal from man, we take the man that appears to be nearest to the animal.

"Let us state first that all the testimonies attest the multiplicity of the languages of these islanders. . . . They counted not less from eight to ten languages or dialects for about two hundred individuals taken in the different parts of the island. . . . The prisoners, forced to live in common, instructed one another, and a sort of *frank* or *common language* formed itself. . . . The Rev. Nixon, bishop of Tasmania, had collected eight children speaking eight languages very different by the words. . . ." (De Quatrefages, *Hommes fossiles et hommes sauvages*, p. 330.) Let them make a simple approachment between this variety of languages at such a restrained and so degraded people, and the constant uniformity of the language at all the animals of the same species; it is, on the one hand, reason and free will; on the other, the pure instinct in its iron rut.

In the series of the variations and transformations which the history of the human languages present, the most ancient epoch, the most primitive epoch, is that of the roots which are the expression of the concepts. The agglutination of the more or less intact or altered roots, the so varied flexions which serve to express the shades of things or action, only come afterward. The word, the human language par excellence, is therefore, from its birth, the expression of reason. There is no directive transition, no possible evolution, from the purely emotional cry or chant to the root, to

the primitive element of all articulate language. In this insurmountable bar let us admit, for the evolutionary history of the human languages, in a just measure, the series of the Darwinian laws or the natural or artificial selection, the influence of the surrounding and of heredity, the affinities, the hybridation, the atavism, the traces of primordial structure and of atrophied organs; let us follow, with the greatest interest, the long chain and each of its ingenious rings; but we cannot admit an endless chain, plunging into the animal world, deprived of reason and of liberty. If one pretends to recover, in the articulate cries of the beast, the philological moner, the embryo of the word, we protest, and whole living nature, from the most highly organized animal until the lowest and most dishonored beast of burden, protests with us, by the everlasting and noisy uniformity of its language.

The Faculty to Invent and to Progress.—We are naturally led to invent and to progress in the power of civilization, another exclusive privilege of man, another consequence of reason and of free will. "Two things cause the rise of inventions," again says Bossuet: "1. Our reflections; 2. our liberty. . . . We notice our sensations, we compare them with their objects, we seek the causes, . . . in one word, we hear and we reason, that is, from one truth we proceed to another, . . . and as soon as we have made one step in this road, our progress has no longer any limits. For the peculiarity of the reflections, is to raise one upon another, so that we reflect upon reflections until the infinite. . . . Those are mistaken who, desirous to give reasoning to beasts, believe that they can confine it within certain limits. For one reflection entrains another, and the nature of animals could raise itself to everything as soon as it could *leave its straight line.*" (*Opus cit.*, ch. v. 8.)

This is a wonderful age. Let a swallow make a nest like a titmouse, let a titmouse make a nest like the swallow, and they will leave the straight line, and then there is no reason why they should stop on the new road in which they have made one first step. Let a locomotive spontaneously leave its rails, and it is done with the inertia of matter; the *inertia of the instinct*, the most wonderful, the most fruitful in prodigies, is absolutely comparable to the inertia of matter. "Man," continues Bossuet, "by the power which he has to reflect, has formed designs; he has sought matters proper

for their execution; . . . *he made instruments, he made arms;* . . . he has changed the whole face of the earth. . . . After six thousand years of observations, the human spirit is not exhausted; it still seeks and finds; in one word, it knows that he can discover until the infinite. (*Opus cit.*, ch. v. 8.) They defined man: an animal that knows how to make tools. (Franklin.) This word has a profounder meaning than it appears; every animal that knows how to make tools possesses the two distinctive faculties of man: reason and liberty; it might thereby "raise itself to everything, and it would be a mistake to wish to confine it within certain limits."

The tool, in its most simple and most coarse form, has given rise to prehistoric science; it has been the revealing sign of the presence of man in the Quaternary ages. There is no savage people that had no tools of some kind. For a long time they believed that the Tasmanians had no apparatus for fishing, no nets, no hooks, but only a straight pole, of which one of its ends was sharpened; they appeared to ignore how to kindle anew the fire, if it happened to become extinguished. To sharpen and to polish the zagais, to nourish and to keep up the fire, this already would be sufficient to reveal the human being. But M. de Quatrefages could collect about these poor inhabitants of the Van Diemen's land, calumniated for a long time, the testimonies of a much more advanced industry. Thus, the Tasmanians, to turn out the opossums, who sometimes hide themselves high up in the branches, helped themselves with a coarse cord, which they slung around the tree and then upheld the body, whilst with a stone hatchet they chopped into the bark those notches which so much surprised the ancient travelers.

Behold, therefore, at a people, which Dove considered as hardly endowed with reason, a system of very rational as well as ingenious climbing, used still in our time of a high and industrial civilization, and which supposes accumulated reflections.

Morals and Æsthetics.—Let us yet borrow from these unfortunate and interesting islanders a last characteristic trait, a last testimony of a higher signification. Among the phenomena and the manifestations of the intellectual order, which show an essential difference between man and the beast, is *modesty*. "A web of a spider," excellently says Joubert, "made of silk and light, would

be no more difficult to execute than the answer to this question: "What is modesty?" Therefore, we shall not attempt to define it; we will say only that it is derived from morals and æsthetics; that it is at once a manifestation of the good and of the beautiful. Now M. de Quatrefages tells us that the Tasmanians, whom he had so well studied, and who seem to represent the savage state in its lowest degree: "Their daily habits show a profound sentiment of decency and modesty. The boys who had outgrown the first childhood had their fire and quarter apart in the camp. In the morning they went off quite early in order not to assist at the awakening of the tribe. The young men never roamed in the woods with women; and if they met a group of the other sex, they should go in another direction." (*Opus cit.*, p. 345.)

To pretend to recognize or only to seek in the animal, even the most domesticated, a simple trace of modesty, would be falling into the worst of the inconveniencies in matters of science or doctrine, it would be falling into the ridiculous. As far as we know they have never attempted this. There is therefore, here again, between man and the beast, the difference which separates zero from any quantity, that is, the infinite. "We are perfectible," says Vigouroux, "the animals, to whatever species they may belong are not this. Writing and various monuments perpetuate our remembrances. Human science grew through the ages, like a river which increases the volume of its water in the measure as it separates itself from its source. The experience of the fathers profits to the children; we inherit the progress which our ancestors made in arts and industry. We are endowed with speech and the language is a treasure of an inestimable prize which brings to us, with the signs that express the things, ideas of the things themselves, and at the civilized peoples, it is a kind of popular encyclopedia which initiates all those who speak it to the very conquests of civilization. The philosophers of Greece and of Rome, the learned of all times, have labored for us and we reap the benefits of their genius. No generation of apes, on the contrary, has labored for another generation of apes; what they teach to one is lost and useless for the others; all is individual; there exists for them no common patrimony that accumulates itself and where they can go and draw as from a capital placed at their interest. All these facts are obvious and undeniable. How, therefore, could man

acquire speech, if he had not always the faculty of speaking? How can he reason, reflect, form abstract and general ideas, if these operations are not an integral part of his being? How could he become *moral*, if the notion of the *good* and of the *evil* is not inherent to his very nature? How did he elevate himself to the idea of religion, if he has not been religious from the very beginning? These are so many questions to which evolution is altogether incapable of answering. Either the evolutionists evade them, or wish us to believe that they solve them by always having recourse to their eternal unknown, or they deny the best established facts." (*Les Livres Saints*, etc., 3d edit., III., pp. 427, 428.)

It is thus that the evolutionists are incapable of explaining the morality of the human being except by pretending that morals are something arbitrary and nothing absolute, that is, by denying them. "As to morals, or the notion of the good and the evil, we cannot affirm that they are absolute at man. This notion regulates itself according to the actual state of society. . . . This notion of the good and evil is the result of the needs of society. . . . The first degree of the societies is the family; at the child, the idea of the good and evil sums itself up in the obedience toward its parents, in the fulfillment of the duties that are imposed upon it, and in the lessons, the punishments or caresses that are returned to it. Let one observe a family of cats or bears, the manner of being of the little ones is their education by the parents; have we not here the picture of the human family, with all the manifestations of the idea of the good and evil one may desire? They are, we have to admit, cat morals and bear morals that are imposed upon and taught to the young animals, but nevertheless they are always morals, and the young cat that does not come at its mother's call, the bear's cub of two years that does not take care in a becoming manner of his younger brothers, will be chidden and slapped in the face quite like all the children of men, if they do not pay attention to the first notion of human and Christian morals." (C. Vogt, *Leçons sur l'homme*, pp. 309, 310.)

Behold the abject doctrines of materialism. Indeed, it brings forward, through the pen of Mr. Vogt, poor arguments. To deny the reality of the idea of the good and evil, it quotes for example the child that has not yet attained the age of discretion, that is, before it has consciousness of the good and evil! It is as if one would deny

that the sun throws its light upon us to-day, because it had not yet the power to launch its luminous rays, when it was still in the nebular state! But nothing proves better how morals distinguish man from the beast than the necessity in which the evolutionists behold themselves to make thereof a simple becomingness, and in the impotency they find themselves to explain them. The testimony of inner feeling protests against such a degradation. Conscience attests to us by a loud voice that the good is the good, that the evil is the evil. The evil might be useful to individuals or to society, but it is nevertheless reprehensible, and the good thereof is not less laudable and worthy of admiration, when it turns to the detriment of the one who commits it. There is only one voice to render homage to Regulus going to die at Carthage, and to the martyr sacrificing his life to be faithful to his religious convictions. Therefore, evolution condemns itself, when, not content to make us descend from apes, but also lowers us to their level, by giving us no other morals but those of the beasts. "I rather prefer to be a perfected ape than an Adam degraded by the fall of the biblical tradition," said C. Vogt. From what precedes, it can be seen which doctrine ennobles man, and which lowers him. Genesis shows us man made by the very hands of his Creator, guilty of disobedience toward his God and father, it is true, but apt to rise again, because he holds his "passions in his hands" (Gen. iv. 7), and which he can dominate. He is free, and he must make use of his liberty to become better and to do good to his neighbor. The moral law exists for him; he is obliged to subject himself to it. He distinguishes himself through both morality and reason. Herein lies his grandeur, herein lies his real dignity. Whilst evolution makes man to descend from the animal, and inspires him with no other morals than those of animals, Christianity says to man: Behold heaven; you must conquer it through the practice of the good and virtue.

According to a Chinese proverb, "the centuries in which they have denied the most of truths are those in which they have dreamt the most of fables." The correctness of this proverb is well justified by writings like *Natürliche Schöpfungsgeschichte* by Haeckel, his *Anthropogenie* and similar books of his followers. How many fables imagined to get rid of God, and to substitute a new Genesis to the revealed Genesis! How many facts, supposed by Darwin and his German disciple, that never have existed except

in their brain! The *pithecoïd man* of Haeckel, and so many other animals which he has invented for the needs of his genealogical chain, are also all as fabulous as the chimera, Pegasus, and the centaurs of Greek mythology. The relationship between man and the ape is also a scientific fable. The "genealogical trees," of the Haeckelian phylogeny, said a man that certainly does not lean towards the Christian doctrine, Mr. du Bois-Reymond, "have about the same value that the genealogical trees of the Homeric heroes have in the eyes of the historical critic." (*Darwin versus Galiani*, Berlin, 1876, p. 15.) Charles Robin said in his turn of the theory of evolution that it is a "fiction," a "poetical accumulation of probabilities without proofs, and with seductive explanations without demonstrations." (*Dictionnaire encyclopédique des sciences médicales*, art., Organe, 2d series, Vol. XVII., 1882, pp. 92, 93.)

The natural sciences rest upon observation and experiment. "Some men," says de Quatrefages, "eminent through science, and rich in imagination, have believed that their hypotheses might pass as truths. Reviving the proceedings of the Greek philosophers, they believed that it was possible to explain the living nature and the entire universe by relying upon some facts through about exclusively intellectual conceptions. Once on this incline, they easily got elated with their own thought. When the positive knowledge, accumulated through the venerable labor of their illustrious forerunners, impeded their speculations, they simply threw them overboard; they have pushed until the end the more or less development of their *a priori*, and had only irony and despise for anyone that hesitated to follow them." (A. de Quatrefages, *L'Espèce humaine*, 1880, pp. 92, 93.)

Evolution seems to triumph, but its triumph will be of short duration. Its success is too noisy to be lasting; it will pass like everything else exaggerated and false. When the passions will have become calmer, one will separate the tare from the wheat, and one will preserve of the theories of Darwin only those which contain some truth. As a learned American naturalist has said: "Darwinism will be one of those phases through which natural history will have passed in the course of this (nineteenth) century. I recognize in the character and bearing of this teaching a certain analogy with that which produced itself when the *physio-philosophers*, inspiring themselves with Schelling, applied his philosophy to natural

history. Also, then, we could see them applaud a quite made doctrine, embracing entire nature, and whose starting point was that man is the summary and the individualized synthesis of the whole animal creation. They dismembered the human body to make of each of its fragments the ideal type of the different classes of animals. We owe to Oken a treatise of zoology, exclusively undertaken with the view to determine each of the parts of this dismemberment of man and of creation; but there has never been, in this grouping of the superior members of the animal kingdom, any other basis but the preconceived idea of a so-called representation of the parts of the human body by each of the general forms of animality. All the knowledge acquired until that time, at the price of very long and laborious inquiries, was put aside and replaced by purely theoretical conceptions. The infatuation went that far that the most specific and the best made labors of the contemporary period were received in the School, only after having been covered with a varnish of the new doctrine. I believe it will be the same with the teaching of Darwin as with that of this sect." (J. L. R. L. Agassiz, *De l'espèce et de la classif en géologie*, pp. 376, 377)

It is the imperishable consolation of the defenders of the Christian doctrines that the error passes away and that the truth remains. The brightness of the sun may somewhat be darkened by thick clouds, but finally it dispels the vapors which veiled its rays. Evolutionism continually makes appeal to the unknown; in order not to be surprised in the very fact of falsehood, it does not affirm what it cannot affirm, but it invokes sometimes the possible, sometimes the past or the future which we do not know. All the experiments are contrary to the spontaneous generation which serves to it as a starting point. It answers, one day they might be able to establish the spontaneous generation. Nobody has ever found any of the links that might genealogically connect one species with the other. It answers, they will find them later on. The savants have looked all over the world, but in vain, for the pithecoïd ape, that imaginary ancestor of man. It answers, the pithecoïd is buried in the ancient continents, submerged to-day by the water.

But the moment will come when the infatuation will be dispelled, and when those whom a false mirage had seduced will perceive that all those pretended answers have no solidity and are only idle phantoms which disappear at full daylight. Then they will

acknowledge that reason, in accord with faith, claims a Creator to render an account of the origin of the universe and of ourselves; they will avow that what the Christians believe is the truth, and that the best, the only explanation of the world and of hierarchy of the species, is the explanation of Genesis. The existence of a plan in the creation, which has inspired such beautiful pages to Fénelon and to so many other genii, will always remain a certain truth. *In principio creavit Deus cælum et terram.* These are the first words of Genesis; they will be the last words of science.

CHAPTER X.

THE STATE OF THE PRIMITIVE MAN AND HIS ANTIQUITY.

WE KNOW the nature and origin of man. He is an immediate creature of God; he is composed of a body and a spiritual soul. The human soul is a substantial, reasonable, and free principle, essentially distinct from the body to which it is personally united, independent of matter in its highest functions, and cannot be the result of a simple biological evolution, no more than a living organism, endowed with conscious sensibility, cannot be the result of a simple evolution from brute bodies.

Man occupies an apart place in the divisible world of the living beings, because he alone is reasonable and free; because he alone, thanks to his reason and liberty, can reflect, create a conventional language, invent and progress; because he alone knows the essence of things, the true, the good, the beautiful, the universal, and absolute. This we have proved.

Now we have to seek and to determine the conditions in which man, this apart being, appeared upon the globe. What are the teachings of faith, what are the teachings of science in regard to the primitive history of mankind?

Two sovereign questions sum up and dominate the history of man before history: 1. Was the primitive state of mankind a savage state? 2. What must we believe about the antiquity of the human species?

These two problems have assumed, in our time, vast proportions; the apparent difficulties, the objections, the misunderstandings which they have raised are of those which might trouble faithful souls, which most easily bewilder if they are not sufficiently studied. The solutions are, however, very clear and very rational; we shall expose them in the present chapter.

And first, in what conditions did man appear for the first time upon earth? What are the teachings of the Christian faith in this regard?

Until at present, and as long as there was only question of the material universe and its formation, of the origin and development of life, the prescriptions of faith were reduced to the most simple expression; they consisted in the only dogma: the creation *ex nihilo*;

the indefinite action of the secondary causes, the work of formation or of development (*opus distinctionis*), being entirely given up to the free inquiries of science. But since there is question of man, of the reasonable and free being, the image of God, the revealed teaching becomes more comprehensive and more explicit.

In itself, man is mortal. His pure nature is, in this, similar to that of other animals; his condition *a priori*, if we may speak thus, is to be subject like them, to the vital evolution, to the action of physico-chemical forces; to be born, to grow, to decline, to suffer, and to die. The proper of his body is to be vowed to the disaggregation of the tomb.

But Revelation teaches us that the first man, that the first human pair was created in a *preternatural* state, that is, with privileges above the strict requirements of nature. These gratuitous gifts comprise — with original justice — the immortality, the knowledge of all he should know to fulfill his destiny, the exemption from physical evil (pain, etc.) and from the moral evil or disorder (concupiscence). After a time of happily withstood trial, he should enter into possession of an eternal felicity, and enjoy the beatific vision of God.

Man abused his moral liberty that was given to him to attain this glorious end; he revolted against his Creator. The spiritual death was the consequence of this original fall; the natural death with all that precedes or accompanies it — labor, suffering, struggle for existence, etc., — was its punishment. Man, as to his material life, became, from that time, similar to the other animals. From the preternatural and quite exceptional condition that had been bestowed upon him, he descended to the ordinary condition of the living beings, he entered the common right of animality. It was a deep fall capable of leading him very promptly, especially from the view of industrial civilization, to the most miserable savage state.

REVELATION OF PREHISTORIC SCIENCE.—What are the teachings of science, of positive anthropology about the beginnings of mankind? A first acquired truth, as we shall see in the next chapter, is the unity of the human species. A second acquired truth, is the essential difference that separates man from the animal. We have proved this fundamental truth by supporting ourselves upon a number of rigorously determined facts or phenomena, and without deviating from the scientific method. An intermediary between the two kingdoms could not have existed; even it cannot be conceived, because reason, that characteristic, indivisible and irreducible faculty,

is or is not *non datur medium*. Hence, at its starting point, the human species, acknowledged as one by science, was all what it should and could be, in itself and by its proper nature. Hence there has been a first man, first human pair, not less essentially distinct from the beast than the most favored and most civilized actual man.

The accounts of observation and of experience, as well as the deductions from metaphysics, certainly lead unto this, but here they stop. None of the anthropological or prehistoric sciences, knows anything, can ever know anything in so far as science is concerned, and in virtue of the methods peculiar to it, about the intellectual or moral condition of *the first man*, of his gratuitous gifts, of his preternatural or supernatural privileges; this is evident. About all these problems which natural philosophy may present, which faith can clear up, we know the answer of positive science: I do not know; *ignoramus, ignorabimus*.

In summary: the conclusions of science agree with the teachings of faith, in regard to the existence of a first man, really man, of a first pair really human. And, since there is question to determine the conditions in which this first pair did appear, science is silent. Therefore, as to this particular and capital point, there is and there can be no conflict.

Let us pass to the second part of the problem: after the first man, *the first men*. This is an important distinction; not only does it contain the solution of all difficulties, but it permits to establish real and striking harmonies between the biblical accounts and the scientifically established facts. If, therefore, we consider no longer the first man such as he went forth from the hand of God, but the first men, mankind after the fall, primitive mankind multiplying itself and spreading over the entire face of the earthly globe, a quite new science presents itself and lends us, about the primitive history of mankind, revelations of an incontestable gravity. The apologist has to count with it; he should subject to an impartial criticism each of its discoveries, each of its conclusions; he must try to know all, in order to clear up all, to harmonize all.

SOCIAL STATE OF THE FIRST MEN.—The evolutionary school tells us that the primitive men were *savages*, in the full sense of this word. In support of its assertion this school pleads:
1. The rudeness of the primitive instruments; 2. The more or

less simian conformation of some human skeletons regarded as the most ancient. Let us follow it on this double ground.

1. *Rudeness of the Primitive Implements.*—It is very true that the implements of the first inhabitants of western Europe, the only ones of which there is question here, were far from being like ours. Their tools in use were exclusively of stone, bone, or wood. No metal was known at that time and none was employed.

What we may question is that this stone age forcibly supposes an absolute state of savagery. The absence of metals is not incompatible with a certain degree of civilization. Ethnography offers more than one example of a similar association. It shows us among certain peoples, whose industry is the most rudimentary, relatively elevated moral and religious ideas. No people is, perhaps, more remarkable in this respect than the Mincopies, those savage inhabitants of the Andaman Islands. Nothing could be more rudimentary than their industry, which is reduced, says Quatrefages, to the exclusive use of wood, shells gathered on the seashore, and stone split in the fire. They are infinitely more barbarous from this point of view than the inhabitants of France in the Quaternary epoch, they do not know how to cut stone nor to kindle the fire when once extinguished. And nevertheless they have a religion, some principles of morality and traditional knowledge that raise them far above the most savage or barbarous peoples. Far from living in a state of wholly bestial promiscuousness, as has been alleged, they are monogamists and severely moral. As to their belief in regard to a future life and to the origin of the world and of man, it comes surprisingly near to the Christian doctrine in this respect. We can say the same of the Negritos of the peninsula of Malacca. They also know how to unite an industry of the rudest character with a knowledge that prevents us from confounding their state with real savagery.

If it is thus with these populations taken, it seems, at the lowest degree of the social ladder, with much more reason may we believe that the barbarity of our predecessors in the Quaternary epoch was neither so profound nor so abject as some wish us to believe. Their industry was, indeed, far superior to that of the Mincopies. At least they knew how to work the stone, and work it with such a skill that we could hardly do as well as they did, even

with the help of our metal instruments. From a lump of flint or quartz they formed an axe, a knife, a saw, a scraper, a lance point, or an arrow. With a bone they made harpoons, barbed arrows, bodkins, even needles; which proves that man used garments at that time. His industry extended still further. According to need he became an artist, and a talented one at that. He has left to us in different localities of Europe, manifest proofs of his skill as an engraver and sculptor. He knew how to represent with great precision most of the animals that surrounded him. Some of these pictures reveal a talent for imitation of which many an artist in our day would be proud. Certainly there is nothing in all this that denotes great barbarity.

It is true, they tell us, that this perfected work dates only from the late Quaternary epoch, and that we must not confound it with the very rude industry of the early Quaternary age. To this we answer that the oval or almond-shaped axes of the earlier epoch are already superior to the stone implements in use among certain savage populations, such as the Mincopies. Moreover, they will not succeed in convincing us that the man who manufactured them was reduced to this sole implement, if implement it was; for we are still ignorant to what use they were devoted, and ethnography points out nothing similar in the tools of the savages of our day. If they exist alone or almost alone in certain layers, it is undoubtedly because they were the object of a special manufacture; but nothing prevents us from believing that in the same epoch, in a neighboring locality, they worked stone in a different manner. We are even forced to admit this contemporaneousness, at least for some of the various types in the Quaternary time, if we do not wish to be forced to the impossible consequence of admitting that man had hardly more than one instrument at his disposition: first the axe, then the scraper, the arrow, and finally the knife. Just as if he had to pass through three long periods before discovering that a blade of flint could be used for a cutting instrument!

It is best, then, to consider all the products of human industry in the Quaternary time as about contemporaneous. Now, viewed thus as a whole, these implements leave far behind those of the most of the savages of our time. From this we have to conclude that man in this epoch was superior to them morally and socially. The very fact that this man progressed, that he triumphed in his

struggle against the animals that surrounded him, that he developed his tools and his industry, alone proves that he was not an absolute savage. Even E. Renan admits this, and all history attests that no people have by themselves succeeded in developing from a savage state. We may say that the primitive man was a barbarian, but we must not call him a savage.

After all, we cannot judge of the state of the really primitive man from that of man in the Quaternary epoch in western Europe, for this would be going against all traditions and probabilities, even against the deductions of linguistics, ethnography, and the natural sciences, by pretending that mankind took its rise in Europe. It cannot be questioned that mankind comes from Asia. If, therefore, we wish to judge of man's social state, his nature, and his industry in the times that immediately followed his appearance, it is thither we must go to study him. Now, to our knowledge, it happened only once that there was established on Asiatic soil the clearly marked superposition of different industries; this was at Hissarlik, on the supposed site of ancient Troy. Schliemann, the author of the famous excavations, tells us that he found superposed ruins of seven distinct civilizations. Now, far from there being progress from the bottom to the top, just the contrary took place, at least starting from the second layer. This discovery, to which the evolutionists affected to close their eyes, is nevertheless one of the most significant. It alone gives us a truer idea of the general march of civilization than all the discoveries that have been made in the West, not only because it shows more superposed industries, but also because being nearer to the cradle of mankind, it necessarily dips deeper into the past, and traces the customs of a people that we can properly consider as primitive, on account of their proximity to the place which saw the first appearance of our species.

2. *Nature of the Human Fossils.*—The rudeness of the implements in the Quaternary time does not, therefore, prove that the first man was a mere savage, and much less that he had an animal origin, as the Darwinian school would have us believe. Does the nature of the fossil human remains prove this any more clearly?

The number of human bones that merit the name of *fossils*,—that is, those which go back at least to the Quaternary time,—is far from being as considerable as was claimed at the beginning of the

prehistoric studies. Even those who claim that man, or rather his precursor, comes down from the Tertiary epoch, acknowledge that they have not yet discovered any human remains dating back authentically to this epoch. This, however, did not hinder them from describing minutely and dividing into distinct species that Tertiary ancestor whom they have decorated with the name *Anthropopithecus*. For those who, like ourselves, keep strictly to the facts, there can be question only of a Quaternary man.

We could quote at least forty localities where they discovered human skeletons, or fragments thereof, apparently going back to the Quaternary time. Unfortunately, the most of these human remains had, in the eyes of the evolutionists, the defect of too much resemblance to the present man. For this reason, M. de Mortillet has thrown out three-fourths of them. He retained only *nine*, naturally those which had the desired forms and tended to confirm the animal origin of man. The pieces on which he has bestowed this honor comprise six skulls, two jawbones, and nearly an entire skeleton. The skulls were found at Cannstatt (Württemberg), at Neanderthal (Rhenish Prussia), at Eguisheim (Alsace), at Brux (Bohemia), at Denise (France); and in the trench of Olmo (Italy); the jaw-bones, in the grottos of Naulette (Belgium), and at Arcy-sur-Cure (France); finally, the skeleton, at Laugerie-Basse (France). Let us throw a glance on each of these precious remains and consider both their authenticity and form.

The skull of Cannstatt, the oldest collected, because its discovery goes back to the year 1700, was found in the locality of this name, near Stuttgart, together, they tell us, with bones of the elephant, bear, and hyena. The evolutionists, who applauded it on account of its passably rude form, are obliged to acknowledge that there are serious doubts as to its authenticity. "It is now believed at Stuttgart," writes an admirer of de Mortillet, Ph. Salmon, "that it was not in the bosom of the Quaternary grounds, but among the rubbish of the cliff with some pottery that it was discovered." Now it is an established fact, in prehistoric matters, that pottery was yet unknown in the Quaternary epoch. The result is that we must discard the skull of Cannstatt, because it is agreed that we must take into consideration only those whose authenticity is unquestioned. M. de Mortillet was not far from acknowledging this when, in opposition to M. de Quatrefages, he refused to make it

the type of the primitive race, and reserved this honor to the skull of Neanderthal.

Does the Quaternary origin of the latter offer a greater guarantee? We are at liberty to doubt this. It was found in 1856, near Düsseldorf, in a clayey alluvion which, they tell us, has furnished some remains of Quaternary species. It is possible; but it is well to add that they have also found polished stones in the same alluvion; something which tends to refer it to the present period. Moreover, nothing proves that we have not to do with an ordinary tomb. The corpse, to which the skull belonged, was lying, regularly stretched out, only two feet deep, like that of a buried person. Now, if there is question of a burial, the association with fossil species proves nothing. Even to-day we sometimes bury our dead in grounds rich in fossils of different geological periods. Shall the future inquirer, who establishes this association, be authorized to deduce therefrom the contemporaneity of man and the animal species, by the *débris* which accompany his own?

Hence, we might refuse to accept the skull of Neanderthal as well as that of Cannstatt. But suppose we acknowledge its authenticity. What must we conclude from this? It is true that the forehead is straight, the cranial cavity elliptic and very long, the bones quite thick, and the superciliary arches remarkably prominent; but there is nothing to prove that this skull is not pathological, as was believed at the beginning. If to-day it is considered normal, it is because there have been found the same characteristics in different historical personages and in a certain number of our contemporaries whose intelligence is at least equal to the average. In its capacity, the skull of Neanderthal is superior to the skulls of the Australians, and attains almost the average of female skulls. Whatever its age may be, the skull of Neanderthal has nothing simian, and the evolutionary school has to look somewhere else for the missing link which it claims exists between man and beast.

We shall pass rapidly over the skulls of Eguisheim, Brux, Denise, and Olmo. They disclose nearly the same characteristics as the preceding, and their authenticity is almost always open to discussion. The first was found, it is true, in a clayey alluvion, which appears to be Quaternary. However, they have discovered in this same clay, and at a considerable depth, three

corpses, of which one at least must have been buried; for it carries on the breast a vase covered with a stone, and near it were found other vases of the same kind, as well as an axe of polished stone. The burial, pottery, and polished stone are, according to the teaching of the school, so many indications of the present period. Undoubtedly, it will be claimed that the presence of these objects at the same depth is due to a disturbance of the ground; but why do they exclude the skull of Eguisheim from this interference?

The same uncertainty exists in regard to the skull of Brux. The report which made it known to us, and which dates only from 1872, expressly states that, in the alluvion where it lay, there was found an axe of polished stone. As they do not note any other Quaternary species in this layer, we are permitted to call in question the date they have assigned to it.

The skull and other human bones discovered since 1844 in a volcanic tufa, near Puy, are probably less ancient than the preceding. Nobody believes to-day, as they did formerly, that they are contemporary with the mastodon. The volcanic tufa in which they were encased, so to say, is evidently very recent, because it surmounts Quaternary alluvions. They may be even posterior to the formation of the tufa, and, consequently, may be due to the last volcanic eruptions of the Denise. Two competent geologists, Herbert and Lartet, who visited the locality in 1857, believed they could recognize therein the traces of a tomb. Whatever their nature may be, these bones cannot give us any useful information about the question of man's origin.

There remains the skull found in 1863, in the trench of Olmo, near Arezzo, Italy. This time the authenticity cannot be questioned, for it was found at a depth of 150 feet, and in the neighborhood of bones with animal characteristics of the Quaternary times. We have less reason to contest it, because, according to de Mortillet, this skull has none of the simian features which he attributes to the primitive man. The form is elongated, it is true, but this form, the *dolichocephalous*, agrees very well with a developed intelligence.

Are the simian characteristics, so ardently sought for by the evolutionists, found any better in the jawbone, discovered in 1865, in the cave of Naulette, Belgium? This was the belief for quite a while, but it is no longer so. The jawbone found in

1859, in the grotto of Arcy-sur-Cure, France, cannot detain us; for, according to the avowal of de Mortillet, the simian characteristics hardly reveal themselves. The chief of the prehistoric school, also refers it to the last part of the Quaternary epoch. The last piece which de Mortillet attributes to the Quaternary times, is a skeleton discovered in 1872, near Laugerie-Basse, on the banks of the Vezere. This time de Mortillet is prudent enough not to draw any conclusion in regard to the primitive man, and he is right, for the skull has been completely crushed by the fall of a rock, and it is impossible to construct its form.

We have exhausted the list of fossil human bones, acknowledged as such by the chief representative of prehistoric science. From the rapid examination we have made it follows that the authenticity of the most of them is debatable; in none of them do we find the simian features predominating. The skulls of to-day do not indicate more perfect beings than those of the Quaternary times. The adherents of the animal origin of our species will have to stop appealing to human paleontology in support of their system. "The Quaternary man," says Quatrefages, "has always been man in the full sense of the word."

II. AGE OF MAN ACCORDING TO PREHISTORIC ARCHÆOLOGY. —"Man appeared in Europe at the beginning of the Quaternary age, that is, at least 230,000 to 240,000 years ago. That is what we read in a book written by M. de Mortillet, one of the chiefs and founders of prehistoric science. So we see that we are far from the biblical chronology. Elastic as this chronology may be, and liberal as we may be in its interpretation, we cannot stretch it to this measure. M. de Mortillet is only logical when he laughs at those who continue "to teach religiously that Adam was the first man." If our species goes back as far as he affirms, we have to acknowledge that the Bible is in error. The person whom it presents to us as the father of mankind can be at most only the father of the Jewish people, who in his pride made himself, they say, the father of the entire human race.

Happily the chronological calculations of de Mortillet do not command our assent. Even many of his adherents do not accept them as serious. The most authoritative scholars of prehistoric science do not hesitate to acknowledge that it is impossible to determine with any exactness the date of the appearance of man.

They are not less in agreement as to the insufficiency of the traditional chronology, in view of the discoveries recently made in the domain of natural sciences.

We are of quite a different opinion. If there were any reason to set back for some thousand years the date of the creation of man, it would be history that would oblige us to do so, and not geology or prehistoric archæology. Egyptian chronology, uncertain as it may be in its beginnings, takes us back to three or four thousand years before our era, that is, to a date anterior to that which most of the calculations based upon the Bible attribute to the Deluge. Therefore, unless we except the Egyptian people from the diluvian cataclysm, as has been proposed, and place before the Deluge the first pharaonic dynasties, which is hardly admissible, we must necessarily increase the interval comprised between Noah and Abraham. Whatever may be said of it, neither geology nor prehistoric archæology has any such need. Let us briefly show this.

We know that the geologists have divided the history of the globe into four great epochs, of very unequal durations, which they have called, according to their order: *Primary*, *Secondary*, *Tertiary*, and *Quaternary*. Their duration, impossible to figure in number of years, diminishes very rapidly from the first to the last. It is from this point of view that the Quaternary period hardly merits to enter into comparison with the preceding ones, so short has it been. It is mostly in France that they have ranked it as one of the great geological epochs. The English have made of it a kind of supplement to the *Pliocene* period, the third part of the Tertiary epoch, and consequently have called it *Postpliocene*. Certainly this term better indicates its real place in the history of the globe than the word *Quaternary*.

In which of these epochs did man appear? Everybody admits that it was neither in the Primary nor in the Secondary epoch; thereby recognizing already the recent date of his advent, seeing that these two epochs together constitute, perhaps, nine-tenths of the geological times. The doubt begins in the Tertiary epoch. Some geologists, endowed with a lively imagination, have pretended to discover in the *Miocene* strata, which represent the middle part of this epoch, artificially cut flints. The Abbé Bourgeois set the ball rolling by labeling the many flints he had found in Thenay

as the workmanship of the Tertiary man. At first he succeeded in enlisting several men of science on his side; but the matter, on investigation, became so thickly enveloped in the mists of doubt that it vanished at last in utter improbability. The reputed works of art, with indented surfaces, are more likely shapeless works of nature. Again, other flints, lances, arrow-heads, spears, and the like, found in St. Prest, probably belong to a later formation. To determine the age of objects found in mud or sand deposits is most difficult, as they may easily have been buried subsequently at a greater depth. In like manner man's handiwork in conjunction with natural causes may have shifted the deposit. Moreover no standard is at hand for gauging the time of the deposits in the several periods. Recent researches, even in the much lauded Somme Valley, have shown that the layers of sand were formed in historic times. Furthermore, it was alleged that *drawings*, which none but the hand of man could execute, adorned the bones of some Tertiary animals. Bones, too, had been produced which had been fractured, so it was said, by the hand of man. Colored impressions were also said to be distinctly perceptible on the bones of a petrified Hipparion recently discovered in Greece. How transparently thin these reasons are, he who runs may read. On investigation, it turns out that the holes and indentures were made by contemporary animals. Many of the alleged marks and drawings are accidental chinks wrought by mechanical causes.

The Tertiary man being thus out of question, there remains the *Quaternary* man. The existence of the latter cannot be questioned. To say that man has lived in the Quaternary epoch is simply to admit that he has been the contemporary of certain animal species characteristic to this epoch, such as the mammoth (*Elephas primigenius*), the woolly rhinoceros (*Rh. tichorhinus*), the cave bears, the Irish stag, and even the reindeer (*Cervus tarandus*), which we find no longer except in the Arctic regions, but which at that time lived in the temperate zone. Now, remains of these animals have been found so often, either together with human bones, or with the rude products of the industry of the primitive inhabitants, that the contemporaneity of both can no longer be questioned. The *fossil man*, on which orthodox writers made war for a long time, is therefore a reality. The Quaternary epoch having been ranked, rightly or wrongly, among the geological times, all the organic

remains which belong to it deserve to be termed *fossils*, and those of man form no exception to this law.

Only, let us hasten to say it, to admit that man exists in the fossil state,—in other words, that he lived in the Quaternary epoch,—does not mean, according to our view, that we have to leave the confines of traditional chronology. Indeed, everything goes to show that the animals which characterize the Quaternary epoch have lived, at least in some localities, until a very recent date, approaching that of the Christian era. Remains of the mammoth have been found in European countries in quite recent formations, for instance, in peat-moors, which are usually referred to the present time. This animal has been found in Siberia in such a state of preservation that the dogs ate its flesh. The elephant, mammoth, or otter, still existed in the north of Africa and in the region of Ninive in historic times, and Parthenopex of Blois maintains that the latter animal could be found among the beasts which formerly inhabited the forests of Gaul. Cesar describes the reindeer as having lived, in his time, in the Hercynian forest,—that is, on the shores of the Rhine.

It is an error to believe that the Quaternary fauna was much different from ours. In fact, it comprised all the savage animals that surround us, together with some species that had to emigrate on account of climatic changes, or fell under the strokes of the hunter, or succumbed in the struggle for life.

Thus we see that, if we are to judge by the animals that characterize it, the Quaternary epoch must have lasted nearly until the Christian era.

It is true that it has some other characteristics, derived from climatology. Who says Quaternary epoch says *Glacial* epoch, these two epochs having certainly coincided, at least in part. At that time, indeed, the glaciers were considerable in extent, and the water courses more abundant than in our days: a double phenomenon which might have been due to the same cause, the melting of the ice each summer occasioning immense inundations, traces of which still exist. But, to recover something of these phenomena, it is not necessary to go back so far in the past as one might believe. History permits us to have quite clear glimpses thereof. Only fifteen or twenty centuries ago the winters were a good deal colder than they are at present. Herodotus describes

the climate of Scythia in terms which would aptly refer to-day to Lapland and Greenland. He shows us this country completely frozen during eight months of the year, and the Black Sea frozen to such a degree as to carry the heaviest wagonloads. Aristotle and others after him tell us that it was so cold in Gaul that the ass could not live there. The Latin writers insist on their part on the rigors of the Gaulish climate, which did not permit, they say, either the culture of the olive tree or that of the vine. Virgil shows us the Danube crossed by teams, and the inhabitants of these miserable countries retiring into caves, clothed with the skin of wild beasts. Ovid, who passed several years in the region of the Danube, shows us this river entirely frozen at its mouth, so that wagons heavily loaded could cross it. He adds that he saw wine frozen in the bottles, and that he crossed over the ice of the Black Sea. Afraid of being accused of exaggerating, he appeals to the testimony of two former governors of Mœsia, who could also establish these facts.

Italy itself did not have at that time its present climate; at least the Latin writers speak of it in terms that would not be true of it in our days. They speak of heaped-up snow, of rivers filled with floating ice, of hard winters that split stone and stopped the course of rivers, and this in the warmest region of Italy, at the foot of the bulwarks of Tarentum. Such a picture could be applied to-day, at most, only to central Europe.

We have the same testimony in regard to the abundance of the water courses. Here geology joins its voice with that of history in attesting that most of the rivers had, 1,500 or 2,000 years ago, a much larger volume of water than they have at present. Michael Rossi has proved this of the Tiber; others have established the same fact for several rivers of Europe, of America, and Asia.

Everything, then, goes to show, both fauna and climatology, that the Quaternary epoch is not so distant from our times. As to its duration, we know nothing; but there is every reason to believe that it was not very considerable. However, we do not need to know it as far as regards the question that occupies us here; for, according to all appearances, man did not see the beginning of this epoch. He did not precede the glacial period, and was not even a contemporary of the great dominance of the glaciers. Hence his origin is comparatively recent.

In support of the vast antiquity of the human race, they also appeal to tools, found sometimes at a considerable depth. These tools have been classified, to mark successive ages of long duration, into ages of rough and polished stone, of bronze, and of iron. The supposed evidence of deposits in caves, of river and other gravels, of fen-beds, etc., are pressed into service. But it staggers our faith in the whole chronological scheme to find, at the outset, that while Dr. James Geikie reckons the boulder clay in which old stone implements are found as marking 200,000 years, Croll, a no less eminent authority, sets it down as 980,000 years old. The age of human implements found under floors of stalagmite in caves, is, however, open to grave doubt, since observers differ greatly as to the rate of deposit at different times. For, while Mr. Pengelly tells us that it takes 5,000 years to create an inch of lime-dropping on the floors of Kent's Cavern, in England, others assert that, elsewhere, it is formed at the rate of the third of an inch a year, which would give a foot in depth in little more than a century. A copper plate of the twelfth or thirteenth century, we are told, was found in a cave at Gibraltar, under eighteen inches of stalagmite. At Knaresboro, England, objects are incrustated with similar calcareous deposit so quickly that, as is well known, a trade in them is briskly kept up. In Italy the waters of the baths of San Felipe, have been known to deposit a solid mass of it, thirty feet thick, in twenty years. It is thus clear that the rate of deposit depends on circumstances. One condition of the surface may supply acids, from decaying vegetation, for example, which may dissolve the limestone much faster than another. It is not, therefore, by any means certain that any given deposits, in a special case, imply even an approach to the extreme age demanded for them.

The evidence deduced from river and other gravels and drifts is no less unsatisfactory. It is, indeed, quite impossible to fix their age either from their depth or their contents. Mr. Wood found the road leading to the Temple of Diana, at Ephesus, more than four yards below the present surface, and obtained remains of colossal sculptures, at the Temple itself, from the depth of six yards and a half. Local floods work great changes, and it is to be remembered that all rivers are much larger in a country still in a state of nature than when human settlement

has in great measure drained off the surface waters. The shifting of river beds themselves, work great changes. M. de Rossi thinks that the beds of drift, in the course of the Tiber, are not older than the Roman Republic. M. Chabas, in a close examination of the tool-bearing drifts of northern France, found that, at one part, bits of Roman pottery, at another, a copper coin of Charles VIII. of France, and at a third, pieces of yellow brick, were as deep in the soil as the stone axes, etc., and finally gave up the hope of fixing the age of anything by its position.

The theory of widely separate ages for old and new stone tools, and for bronze and iron, is one of the scientific fancies which further investigation overthrows. To use the words of the Duke of Argyle: "There is no proof whatever that such ages ever existed in the world." Nations may all at a certain time have used stone tools, but the discovery of the metals must have been made much sooner at some places than at others. Thus, though flint implements have been found in abundance in South Africa, iron has been known from very ancient times over a large portion of that vast continent; iron ore, as Sir Samuel Baker informs us, being so common in Africa, and of a kind so easily reducible by heat, that its value might well be discovered by the rudest tribes. Stone, moreover, is rare in some countries, as, for example, in Mesopotamia, and hence it is not surprising to find that stone implements of a very rude character coexisted there with advanced civilization in agriculture and commerce. Each "age," in fact, runs into the other, and tools of all the four kinds were used in not a few localities at the same time. So far from being indefinitely ancient, the stone age, in all its characteristics, has prevailed during even the historic period. A well-made bronze pin was found in an excavation at the Isle of St. Jean, near Maçon, in France, which till then had yielded only remains of the polished stone period, and M. Chabas found iron under similar circumstances elsewhere.

In fine, of all the chronologies, that of which the Bible furnishes the elements is still the most authorized, and wherever we may look, we find nothing, absolutely nothing, in the natural sciences that clearly tends to discredit it. No more on this point than on others can the traditions taught in the text be given the lie.

CHAPTER XI.

UNITY OF MANKIND

THE unity of mankind, proceeding from a single pair, is, from the moral and dogmatic point of view, one of the most important truths which result from the account of the creation of man. The dogma of original sin presupposes the community of origin of all men, and upon this community of origin human solidarity and fraternity are founded. In our days, however, it finds a great number of adversaries and we have to answer their objections. The advocates of a plurality of the human species, or the polygenists have largely increased in both Europe and America of late years, and they strenuously oppose the doctrine of monogenism.

I. HISTORIC GLANCE ON POLYGENISM.—The first polygenist whose opinions caused some notice was La Peyrere, a Frenchman. In his book *Système theologique fondé sur l'hypothèse des Preadamites*, published in 1655, the two principal ideas which he sets forth are, that Adam was not the first man, but only the father of the Jews, and that Moses is not the author of the Pentateuch. According to him, chapter i. of Genesis relates the creation of the Gentiles or pagans; they were produced at the same time as the animals, and they appeared at the same time upon earth; these are the Preadamites. Chapter ii. of Genesis, on the contrary, makes known to us the origin of the people chosen by God to preserve the deposit of revelation. Adam is the first Jew and the father of this chosen people. Made from the slime of the earth, he received existence only after the rest of the seventh day; alone with Eve he inhabited the earthly Paradise; he alone with Eve violated the prohibition which God had made as to the eating of the fruit of the tree of knowledge of good and evil; the other men, spread at that time over the globe, had no share in the sin of Adam.

La Peyrere pretended to find the proof of this distinction of diverse species of men in the fifth chapter of the Epistle to the Romans, and in certain facts related by Moses. St. Paul says that men have sinned; some, after the promulgation of the law, against the law; others, before the law, against nature. His new interpreter concludes from this that there existed before the men who

were subject to the law,—that is, before the Jews,—other men of a different species. But the law of which the Apostle speaks is that of Moses, and in the time of Moses there existed already upon earth numerous nations, descended like the Jews from Noah and for whom the legislation of Sinai had not been made. La Peyrere sought to establish, it is true, that the Preadamites were mentioned in the history of Cain, because the latter was afraid of being killed by those whom he might meet and who could only be men of non-Adamitic origin. He alleged also the existence of a city in this time, when the descendants of Adam, however, could not be numerous enough to form considerable agglomerations, and, finally, he pointed out the distinction between the sons of God and the daughters of men or of Adam, whose union produced the giants. According to him, the sons of God were not of the race of Adam.

Later on, La Peyrere retracted his errors, and his book remained unfinished; but his arguments were taken up again in our time by the American polygenists, as we shall see further on. In the seventeenth century his system found no supporters, but things were to be different in the eighteenth. Voltaire, who collected in his writings all that preceding ages had imagined against our Sacred Books, did not fail to uphold that there exist diverse "species of men." "Only a blind man," he says, "is permitted to doubt that the Whites, Negroes, Albinos, Hottentots, Laplanders, Chinese, and Americans, are entirely different races." Soon the negation of the unity of the human species became the fashion in the philosophic camp, and, despite the authority of the most of the naturalists, notwithstanding that Linnæus and Buffon without hesitation pronounced themselves in favor of the old doctrine, the pleasantries of the patriarch of Ferney prevailed.

Infidelity had favored polygenism in Europe; political causes contributed a good deal to increase the number of its adherents in America. One of the most celebrated defenders of this system, Mr. Nott, has himself related the following fact. In 1844, the Secretary of State of the United States, Mr. Calhoun, had exhausted his arguments in answering the pressing notes which England, backed by France, addressed to him on the question of abolishing Negro slavery. He could imagine nothing better than to support himself upon the authority of American anthropologists, and

he defended his government in the name of their theories, according to which the black men are of another species than the white. The cabinet of Great Britain was nonplussed by this unlooked-for argumentation, and thereafter ceased its importunities.

It is certain that several American scientists allowed themselves to be influenced by the more or less unconscious desire to justify slave-trading and slavery. The most celebrated among them are Morton, Nott, and Gliddon. These polygenists expressly admitted the fixity of the species, and even supported themselves upon this fixity of the species to conclude from the actual existence of human varieties as to their primordial and original existence. Since that time there has been a complete change in the system, and to-day we have to look for the polygenists among the ranks of the adherents of the changeableness of the species, among the materialists and atheists, the defenders of evolution without limit. In their opinion man has not been created as man; he has become such by a series of transformations, abrupt according to some, slow according to the majority of them. The lower species perfected and gradually raised themselves to language and reason, to the status of the intelligent and perfect being. Thus nature has produced by divers means diverse human species. That which Scripture teaches about our origin is consequently irreconcilable with the accounts of the new science.

However, if the adherents of the plurality of the human species have become quite numerous, those of the unity of mankind are far from throwing away their arms and abandoning the battlefield. Not only among the faithful, but also among the indifferent, and even among the free-thinkers, monogenism counts defenders not less enlightened than convinced, and recruits new adherents every day. Lyell and Huxley acknowledge in express terms that all men may descend from one single pair; Alexander von Humboldt formally declares himself for the unity of our species, so also the anatomist Owen and the learned Prichard. The labors of the learned Protestant, Quatrefages, in favor of the unity of the human species enjoy a universal and well-merited reputation. The numberless proofs accumulated by this eminent anthropologist, as well as by many other naturalists, establish in a peremptory and decisive manner that science is far from being in contradiction with Scripture, according to which all men belong to the same species. Now it

remains for us to show this accord of science and faith; but as the American polygenists, in order not to fall into contradiction with the Bible, have followed the errors of La Peyrere and pretended that monogenism is not a Christian dogma, before all we have to answer their objections and to rectify their false interpretation of the sacred text; then we will set forth the proofs of the unity of the human species.

II. GENESIS AND THE PREADAMITES.—The arguments alleged by some of the scientists of the United States to turn Genesis in favor of their opinion are summed up in the following passage:—

“Why still hesitating whether to throw the Bible under the wheels of progress? Already many sincere Christians confess that the moment has arrived for preparing the reconciliation of the doctrine of the polygenists with the sacred texts. They are disposed to admit that the narrative of Moses does not apply to the whole of mankind, but only to the *Adamites*, to the race from which God’s people sprang; that there could have been upon earth other men about whom the sacred writer did not need to busy himself; that it is nowhere said that the sons of Adam contracted incestuous unions with their own sisters; that Cain, driven toward the Orient after his fratricide, was marked with a sign, so *that whosoever found him should not kill him*; that aside from the race of the children of God there was a race of the children of men; that the origin of the children of men is not specified; that nothing authorizes us to consider them as the children of Adam; that these two races undoubtedly differed in their physical characteristics, because their union produced mongrels designated under the name of giants, ‘as if to indicate the physical and moral strength of the crossed races’; that finally these different antediluvian races could have survived the Deluge in the person of the three daughters-in-law of Noah.” (J. Pye Smith, *Relations Between the Holy Scripture and Geology*, 3d edit., pp. 398–400.)

Let us take up these several arguments one after another. In the first place, it is not true that Genesis speaks of different human species. When La Peyrere beheld in the man created in the first chapter a man different from the one whose history the second chapter relates more in detail, he falsely interpreted the original text, for the Hebrew text in both cases calls by the same name Adam, the rational creature gone forth from the divine hands.

Morton himself is obliged to agree that "the sacred writings, according to their literal and obvious sense, teach us that all the men descend from a single pair" (*Crania Americana*, Introd., Philadelphia, 1839). Moses, conformable to the uniform and unchangeable plan which he followed in drawing up the first book of the Pentateuch, sets forth in the account of the earthly Paradise the history of our first father, whose creation he had simply announced in the account of the general creation. Then he continues the history of the children of Adam, without troubling himself to fill up a certain number of breaks, because the things which he omitted are naturally understood and cannot cause any doubt in the minds of readers generally. Thus he supposed that it was useless to relate in express terms that, from the beginning, Adam and Eve had daughters as well as sons, and that the brothers had taken their sisters for wives; everyone understands this without being told. Besides, the sacred writers generally mention women only in a vague manner in their genealogies; they are expressly named only when the sequel of the narrative demands it for fear of being unintelligible. Moses had no reason to inform us in so many words that Cain and Abel married their own sisters; this appears clearly from his account, and everybody knew it. In reading Genesis simply and without partisan spirit, one cannot help acknowledging that Moses knew no other men than Adam and his posterity.

But, they say, if there existed no other men but the Adamites, how could Cain, after having committed his fratricide, be afraid of being killed by those whom he would meet? It is easy to answer that it was because he could not forget that men would become multiplied, and as remorse and a bad conscience render one suspicious and restless, what is there astonishing in the fact that he was afraid that his crime might be avenged by his own death, when the children of Adam would have become more numerous?

Some have endeavored to enforce the objection and to establish the existence of another race by what the Scripture tells us: *Cain built a city, and called the name thereof by the name of his son Henoah* (Gen. iv. 17). We have shown in another place that we must not understand this word "city" in the sense in which we employ it to-day.

A last argument is drawn from the mention of "sons of God" and "daughters of men." *The sons of God seeing the daughters*

of men, that they were fair, took to themselves wives of all which they chose (Gen. vi. 2). Here, the polygenists claim, there is question of two different species of men. The daughters of men are called in the original text "daughters of Adam," that is, the posterity of Adam and Eve; the sons of God belong to another race which has nothing in common with those whom we call without reason our first parents.

Such is the objection. It is false, because the "sons of God" cannot be understood of non-Adamic men. The descendants of Adam were the creatures of God and consequently the sons of God, as much as every other species of men which one might suppose, or, better still, they would have been more so, if several creations had existed, because God, distinguishing and separating them from all the others, wished to make of the posterity of Adam, in the person of the Jews, His chosen people. It is generally believed that the "sons of God" are the descendants of Seth, who had remained faithful to the Lord, whilst the "daughters of men" are Cainites, whose fathers were impious; but, whatever may be the exact meaning of these expressions, it is enough for us to state that the interpretation of the polygenists is a manifest countre-sense and consequently unacceptable.

All the arguments which they have tried to draw from Holy Scripture against the unity of the human species are, therefore, false and without value. St. Paul rendered correctly the meaning of Genesis, when he declared that all men who live upon earth descend from the same father (Acts xvii. 26). The doctrine of monogenism is truly a biblical doctrine.

Since it is thus, we have only now to establish that Scripture in regard to this subject is not in disagreement with science, not in the sense that science can prove that all men descend from one pair,—this question is out of its domain,—but in the sense that it establishes that all men form only one species. The scientific objection against monogenism is drawn from the differences which we remark among the human races. We will explain first the diversity in the races actually existing, and, second, we will establish the unity of mankind.

III. DIVERSITY IN THE HUMAN RACES—I. *General Observations*.—The most popular argument in favor of polygenism, that which most strikes superficial minds and those little accustomed

to reflection, is that drawn from the remarkable exterior differences which distinguish the diverse human races from one another. The enemies of the unity of our species also insist upon this point the most. The learned of our day have repeated only in other terms what Voltaire had said, that the Negro with his woolly hair and the white with his smooth hair cannot be of the same species.

In the physical order there seems to be an abyss between one another. In the intellectual or moral order how different also is the intelligence of a native of Terra del Fuego from that of a Plato, a St. Augustine, or a St. Thomas? And if in imagination we assemble, from among the millions of men that at present people the earth, representatives of all the living languages and make each one express himself in his own language, or dialect, what a *cacophony*! What confusion! How can all these men who express themselves in such a different way descend from the same mother? How could their fathers of old have called the same things by the same names? That is what strikes the crowd and impresses the groundlings.

But nevertheless, when we look closer, when we reflect on what these differences and contrasts in reality are, we perceive very soon that we cannot draw from this any conclusion. Intermediary rings exist and form only one long chain. Between the Greek of Athens and the Esquimaux, there are a thousand gradations, which from the Hellenic type reach down to ugliness by a regular descent. From the obtuse mind of an inhabitant of Terra del Fuego to the intelligence of a Plato, there are equally numerous steps by which we mount gradually from the depths where degraded man possesses only some material and gross ideas, up to those serene heights where flourishes the philosophy of the Academy and of the Angel of the School. And in the physical order, as in the intellectual, the transition is effected by means of an almost indefinite series of stages, degeneration, proceeding only through shades hardly perceptible from one another. In a word, the contrast no longer surprises, when one passes through all the intermediary degrees.

2. *Causes of the Diversity in the Human Races.*—It cannot be denied, however, that there are differences existing among men. Just as the lightest blue and the darkest blue are distinct, in spite of the shades that unite them, so also there are distinct races in

the human species, in spite of the ties of relationship that connect them. We are careful not to deny these real distinctions; what we wish solely to establish is that these differences do not exclude the community of origin; that these varieties, these races, do not constitute diverse species; that the polygenists are mistaken when they confound the races with the species and conclude from the diversity of the human races the plurality of the species. As to this some indispensable notions and definitions are subjoined.

The *species* is a collection of individuals having the same essential characteristics, descending from the same primitive pair and enjoying the faculty of reproducing themselves indefinitely. A group of species having common characteristics is called *genus* or *kind*. The species is unchangeable in its essential characteristics, but its accessory characteristics may become modified and changed, under the influence of diverse causes, and then give rise to *varieties* and *races*. We call *varieties* the groups of individuals of the same species which are distinguished from the common type by accidental modifications. These modifications are not essential and specific, but changeable and unstable by their very nature, although, on account of peculiar circumstances, they may become fixed and lasting. In virtue of the natural law of reversion, the varieties return of themselves to their original type, unless external causes, and particularly the union between individuals of the same variety, render these passing characteristics permanent, conformably to the law of heredity, which transmits to the children the qualities peculiar to the parents. When the accessory characteristics which constitute a variety are fixed and perpetuated in a constant manner by generation, they form a *race*.

By applying to the human species these notions, universally admitted by all former naturalists, it will be easy to account for the phenomena which humanity now presents. The solution of the problem is just this: All men who live upon earth form only one species, but this species comprises several particular races; these races all have for their starting point some primitive varieties, produced accidentally or naturally through diverse causes, and whose characteristics have become hereditary. The varieties may have manifested themselves sometimes through the effect of a sudden change in some individuals; generally they must have been the accumulated result of gradual modifications, brought on by the par-

ticular circumstances in which the subjects found themselves placed, among whom these alterations from the original type were produced. The error of the polygenists consists, therefore, in confounding the races with the species and in pretending that the accessory characteristics which distinguish the races are specific characteristics. We shall show that these characteristics are not really specific, but have, or at least may have, an accidental origin. Now, to show that science is not in contradiction with Scripture on the fact of the unity of the human species, it is enough to establish that this unity is scientifically explainable and admissible, and that anthropology is entirely unable to prove the plurality of the human species.

That which establishes in a peremptory manner the possibility of an origin common to all men, is that there exists in no race any distinctive characteristic which is not found exceptionally in some individuals of another race. None of these characteristics is, therefore, really specific, for, in the contrary case, we could find it only in the species to which it would properly belong. Since it appears accidentally in individuals of diverse races, it follows that it could also be produced primitively in the same manner, and that it became common in certain fractions of humanity only in virtue of what we call the influence of surroundings and heredity. For the rest, to convince ourselves, we have only to study successively the various characteristics of the races and to show, by the light of observation and experience, that they are all accidental and not essential to the species; consequently, the fruit of circumstances, and not a quality without which it is impossible to conceive an individual belonging to our species.

It is so true that the characteristics of the races have nothing absolute, but are on the contrary very relative, we might almost say arbitrary, that until now anthropologists could not come to an understanding in determining them, some adopting such a characteristic as sufficiently distinct, others rejecting it as subject to too many exceptions. Hence, in spite of the accumulated labors of many learned investigators, they have not yet agreed on a classification of the races that is unanimously or even generally accepted. Thus, there neither exists, nor can there exist, a really scientific classification of the human races. In other words, all the divisions that have been proposed are

arbitrary, and no characteristic has been discovered that is exclusively peculiar to each race. Hence, they belong more or less to one another.

However, as it may be as to the races, it follows at least from what we have just seen, that the principal characteristics which distinguish men from one another are the diversity of organic conformation, color, hair, and language. These are characteristics which we have now to examine, in order to establish whether they are really original or whether they are simply accidental deviations from the primitive form, having become stable in the course of time.

By examining these characteristics one after another, we shall see that they can originate from the influence of surroundings, and from that of heredity. By "surroundings" we understand the climate, nourishment, mode of life, customs, civilization, in a word all that pertains to the places and times in which one lives and which may exercise a certain influence on the physical, intellectual, or moral development of the individual. The influence of surroundings is indisputable in natural history. A vast number of perfectly established facts furnish the proof.

Vegetables become white when sheltered from light, and the effect is not superficial, but extends even to the fibres of the plant, to its taste, and to other succiferous qualities. The animals of the polar regions become white at the approach of winter. The Swiss ox becomes, in two generations, on the plain of Lombardy, a Lombard ox. Two generations also suffice to change the bees of Bourgogne, which are small and brown, into bees of Brescia, which are large and yellow, when raised in the latter district. In the warm regions of South America, European cattle have by degrees lost their hair. The dahlia, sent from Mexico to the botanical garden of Madrid, produced there in 1791 a flower which had nothing remarkable about it. It was cultivated, not as an ornamental plant, but because it was believed to be a *succedaneum* of the potato. However, the surroundings into which it had been transported finished by transforming it entirely. In 1810, some flowers of seedlings attracted attention and florists commenced to cultivate it with care. In 1834, they had obtained the varieties which to-day make the dahlia one of the principal ornaments of our flower-gardens. Dogs, in particular, offer us a striking example

of the changes produced by environment. The following example is related :—

“A man went to live under the polar circle; his dog followed him and clothed himself with the thick fur of the spitz; the man, with his companion, passed to the intertropical regions, and the dog lost all his hair. And it was not merely the exterior that underwent a change, but the skeleton was affected, together with the bony head, like the rest. Who would confound the skull of a bull-dog with that of a greyhound?” See art. RACES, in Dictionn. encycloped.

The influence of civilization and environment upon man himself is established by a number of facts. The sedentary Arabians of Hauran are of high stature and adorned with a very strong beard, whilst their nomadic brethren, the Bedouins, exposed to all the vicissitudes of an unstable life, are small and have hardly any beard. To make amends, they have a more piercing look. For the rest, the difference commences to be perceptible only at the age of sixteen years. They have remarked at Morocco the same difference between the Arabs who dwell in cities and those who live under the tent. In many countries, there have been established notably different characteristics among the noble families and the common people. The Arabs of the North compare the nobility to the palm-tree; and the people to the brier. If a different manner of living produces differences in the same country, with much more reason does the complete change of environment carry with it considerable modifications.

The Frenchman, transported into Canada not many generations back, has seen the change of his complexion, physiognomy, and hair. In the United States, in the same lapse of time, the Anglo-Saxon has given rise to the *Yankee* race, which differs from the mother-stock in certain exterior characteristics. Since the first creole generation, this same English type has become so modified in New Zealand, as well as in Australia, that the eye distinguishes at once *the persons of the old soil*, from *the children of the new soil*.

The influence of environment on the organic constitution is therefore, certain and incontestable. Heredity is another factor

which is sufficient in itself to explain a portion of the phenomena that we are studying. It is the peculiarity of living beings to repeat or to reproduce themselves with the same forms and attributes. A white man transported into warm countries, takes such a dark shade that he might be mistaken for a black man; however, his son is born white and keeps himself thus, as long as he is not subject to the same atmospheric conditions. The intellectual qualities transmit themselves as well as the physical characteristics; in the family of Bach, there were thirty-two musicians.

An accidental quality, a variety producing itself spontaneously without any known cause, may transmit itself through heredity and thus constitute a race. In 1790 there appeared in Paraguay a bull without horns. At the end of a few years this breed had covered entire provinces. Cases of peculiar characteristics produced spontaneously and transmitted by heredity abound, and this law of transmission is universally admitted by naturalists.

The influence of heredity and that of environment may unite and combine themselves so as to tend towards the same end and thus render more stable the characteristics which differentiate the races. The environment insensibly brings on more or less considerable changes; heredity fixes and perpetuates them, so that the modifications due to climate, or mode of life, for instance, may still continue to exist, and transmit themselves in a certain measure, even under another climate and with other habits and different civilization. Finally, the crossing or mixture of races produces new modifications, intermediary or sub-races, capable of perpetuating themselves with their new characteristics, when the circumstances are favorable.

With the help of these certain and indisputable principles, all the differences that distinguish the human races from one another, explain themselves without difficulty, and in a satisfactory manner, as we shall show. Let us begin by accounting for the diversity of color.

3. *Color in the Races.*—The color of the skin is no specific sign. Darwin himself acknowledges that nothing is more uncertain, or, according to his expression, "more floating than color." It is such an accessory quality that we can find its whole series in a single animal. Among the colored peoples themselves, black is so little essential that "at the moment of birth, the Negroes are not black;

they become so only through contact with the atmosphere," says Pruner-Bey. Besides, the cause of this phenomenon is well-known to-day. Color is caused by the carbon pigment found in the Malpighian cells. These cells are also found in the colored places of the white man's skin. The sun cannot suddenly effect this transformation, but it may further it in the course of time. A change in the color of the skin may have easily been caused by the sun acting in conjunction with moisture, temperature, manner of living, and other climatic factors. The physiological explanation is that respiration, being retarded by heat, fails to change all the carbon into carbonic acid. The light playing on the surface materially aids the process. Parts not exposed, like the sole of the foot and the palm of the hand, are less dark even in the Negro. Arabian women, who go about well wrapped up, are as white as Europeans. Even in the same country and climate this influence acts in different degrees, although the skins are generally darkest in warm countries. Anyhow, side by side with secondary and accidental causes, light and climate will always be regarded as the chief factors in producing the change. The experience gained in America during three hundred years has shown that the color and facial expression of Negroes are undergoing a slow change, especially when they are brought into Northern countries.

4. *The Hair in the Human Races*.—With the characteristic trait of the color of the skin in the human races is intimately connected that of the color and nature of the hair, for there is almost always a correlation between them. Thus, the black always have black hair.

Some anthropologists of our day attach great importance to the hair-conditions of man. Even some polygenists have attempted to make it the basis of a differentiation of the human species. But, in spite of the differences in color and form, the hair is essentially the same among all men, and the change from one variety to another is effected only by insensible gradations. The so-called woolly hair of the Negroes is such only in appearance. Age and climate have an admitted influence on the hair. We know that the color of the hair changes with age. Often from a light color at the time of birth, it gradually takes on a darker shade, and finally becomes white in old age. "The hair of the newborn Negro is generally more of a chestnut color than black;

it is straight and slightly curled at the end," says Pruner-Bey, that is to say, it then resembles, just as in the color of the skin, that of the European. Generally the Negroes become grey quite early.

The hair in the human races is, therefore, only of secondary importance, and does not establish in any manner their diversity of origin.

5. *Forms of the Skull*.—Differences in the human races, for instance, in the skeleton and in the formation of the skull, are also of little importance. Occupation and manner of living, and malformations, intentional or otherwise, may have had their share in producing a clear but variable type in a short time. Such deviations, however, in the animal world do not hinder the various races from forming one species. In man the difficulty is even less. For as the races are generally fertile, intermediate forms are possible everywhere, and these act as links and transmission agents. Blumenbach has pointed out that transitional forms grow more and more numerous. Humboldt considers that the many intermediate stages in skull formation and in the color of the skin are a strong plea for unity. The transition of races is made still clearer by modern researches. The American stock is the connecting link between the Caucasian and the Mongolian; the Malay bridges over the Caucasian and the Negro. The difference between the highest and lowest types may well be greater than that between the lowest human and the highest animal type; but, as in the species of animals, the intermediaries equalize the difference and leave the human type unaffected. The orang-outang is brown like the Malay; the gorilla and the chimpanzee are black like the Negro. But neither all Malays nor all Negroes have the same intense coloring. Similar climatic influences may have been at work to produce similar results in both man and apes. Whether the orang-outang has a round skull like the Malay, and whether the chimpanzee's skull is elongated like that of the Negro, are points still hotly debated by the learned; in any case the identity would not be sufficient to establish descent.

6. *Higher and Lower Races*.—The distinction into higher and lower races proves neither anything against the unity of the human species. The Caucasian has no claim to the highest place; for other races are equally complete, and equally adapted

to their environment. The Negro can endure heat and cold and withstand fatigue better than the Caucasian and American. And in this respect the Malay, climate notwithstanding, is superior to the European. In intellect, however, the case is different. No one denies that the very lowest races are still human. But there is a wide-spread opinion that some races are, and have been, low, and will never rise. Darwin could hardly believe that the inhabitants of Terra del Fuego were men. Similar stories are told of Australians and Polynesians, and in the case of Negroes have passed current as an axiom. Intellectual inferiority is regarded as a specific characteristic of the Negro race, especially of those stocks that are the typical representatives of the race. It is likewise pretended that the ape approximates man in the formation of the brain. With the physical differences, we have already dealt; but speech and reason clearly demonstrate that the intellectual difference between the ape and the Negro is specific; whereas, there is a difference of degree only between the Negro and other races. The intellectual inferiority of the Negro and savage tribes has been grossly exaggerated. Even Darwin was subsequently obliged to reconsider his verdict on the people of Terra del Fuego. Owing to the praiseworthy efforts of the missionaries, notable results have already been achieved. This proves that they possess a great capacity for education. The Indians often display great shrewdness and intelligence. Thanks to Jesuit influence, a new and able nation has sprung up in Paraguay, Colorado, and elsewhere. Negro children educated in America and Europe learn easily. All tribes are susceptible of education and culture; all are possessed of a greater or less intelligence.

6. *The Plurality of the Languages.*—The plurality of languages does not prove anything against the unity of mankind. Languages are, in fact, as numerous as independent peoples, and history tells us that language and customs were the great barrier that separated tribe from tribe. Some people have, indeed, changed their language. One original language may not be an absolutely certain proof that the human race is one. Still language is a certain guide, and the original language is at least a negative proof, and affords a strong and positive presumption in favor of unity of mankind. Whence comes it that languages differ? This question, though hardly ever broached formerly, seems now to be the sub-

ject of discussion. Outside the Old Testament there is scarcely a record of any nation occupying itself with the problem why languages are many, instead of one. The Indians of Central America have a legend, similar to the account of Scripture, that all men formerly had one speech and one religion, but that when the people of Tulan worshipped false gods, their speech was changed.

"Though languages," says Humbolt, "may at first sight appear very different, though their notions, humors, peculiarities, may seem singular, nevertheless, they betray a certain analogy, and we shall understand their numerous relations better according as the *philological* history of nations and the study of language becomes more perfect." The last twenty years have proven the correctness of this view to a great extent. The Mosaic account represents nations as related whose relationship antiquity was unable to recognize. The Romans and Greeks, in spite of their culture, never dreamed that they were more nearly related to the Aryans and Germans than were the Syrians and Tyrians. What Holy Writ had stated, the science of the nineteenth century has confirmed: Ionians, Aryans, and Germans are of common origin. The study of language has proven that before the ancestors of the Hindoos and Persians emigrated toward the south, and before the Greek, Roman, Celtic, Teutonic, and Slav colonies went to Europe, there was probably on the plains of Asia a tribe of Aryans who spoke a language which was not Sanscrit, nor Greek, nor German, but which called the Giver of light and life by the same name, which may to-day be heard in the temples of Benares, in the basilicas of Rome, and in the cathedrals and churches of northern Germany. "All the Indo-Germanic languages," says Pott, "were identical before the separation; they exist in the germ of one original language, which disappeared when they were differentiated from it."

In conclusion, we can hold that the Mosaic account, which tells us the division of languages took place a long time after the creation, and brings this division into immediate connection with the division of mankind into different nations, at the building of the Tower of Babel, appears to be confirmed by the teachings of the science of language.

CHAPTER XII.

THE NOACHIAN DELUGE

BY THE Noachian Deluge we understand the inundation which took place at an unknown date in ancient times, and which, according to the account of Genesis, covered the whole earth and caused the destruction of all mankind, with the exception of Noah and his family. After having described this extraordinary phenomenon we shall establish its historic reality, extent, and nature.

I. DESCRIPTION.—I. *Moral Cause and Prophetic Announcement.*—The malice of men, descended from the union of the Sethites and Cainites, and their violence increasing continually, and having attained its extreme limits, God repented of having created man and resolved to exterminate guilty mankind and all the beings that had been the instruments or witnesses of their crimes. Noah alone, who was just, found grace in His eyes, together with his sons Sem, Cham, and Japheth. The means chosen by God to revenge His outraged justice and to purify the earth was a general inundation, which would destroy the life of all living beings. The instrument of salvation, which should preserve the hope of mankind, was an ark or vessel. God Himself indicated its dimensions and designated the men and animals that should enter therein to repopulate the earth. He also ordered Noah to place therein the food necessary for its future occupants (Gen. vi. 1-21). The Deluge was, therefore, in the designs of God, a chastisement for the crimes and perversity of men, and at the same time a means of preservation and of the reconstitution of a new mankind in the true faith and good morals. It was a providential event, willed by God's wisdom as well as by His justice.

2. *Realization.*—When Noah had complied with all the divine orders, whilst his contemporaries continued, in spite of the warnings given to them, their indifferent and dissolute life, God ordered him to complete his preparations and to enter into the ark with his wife, his sons, and their wives, eight persons in all (I. Peter iii. 20). As to the number of animals of each kind that were to be taken into the ark, the commentators have never been in accord. Some believe that God had fixed seven pairs of pure animals and two of impure animals; others have counted only seven pure and two impure

individuals, the expressions "seven, seven; two, two," being distributive numbers. Seven days afterwards, all having been done as God had commanded, and the Lord Himself having closed the door of the ark, the waters of the Deluge spread over the earth. It was the seventeenth day of the second month and sixth hundredth year of the life of Noah. *All the fountains of the great deep were broken up and the flood-gates of heaven were opened, and the rain fell upon the earth during forty days and forty nights.* Thus only two physical causes of the inundation are metaphorically indicated: The invasion of sea water upon the earth and a torrential rain. It has been believed that "the fountains of the deep" designated the subterranean sources abundantly gushing forth their waters, but they are rather the waves of the ocean which, leaving their natural reservoirs, broke over the firm earth and covered it. The Hebrew word *tehom*, employed here, more often means the sea (Is. li. 10; Ps. xxxvi. 7; lxxviii. 15; Amos vii. 4) than the subterranean fountains (Job xxxviii. 16; Ps. lxxi. 20). "The flood-gates of heaven," which being opened allowed the escape of cataracts, signify in the popular conception of the earthly atmosphere the clouds which burst and spread a furious rain, *gésém*. The inundation was progressive, and the waters increasing raised the ark and submerged the whole surface of the earth. All the living beings and all men, except those shut up in the ark, perished. Whilst the saving vessel floated and the hand of God held its rudder (Wis. xiv. 6), the waters rose, and their height became such that they surpassed by fifteen cubits the summit of all the mountains that are under heaven. They covered thus the earth during one hundred days (Gen. vii. 1-24).

3. *Diminution and Cessation.*—At the end of this time God remembered Noah and the beings that were in the ark and He caused the Deluge to cease. The causes of the inundation acted no longer; the fountains of the deep and the flood-gates of heaven were closed, and the rains stopped. A brisk and warm wind, which God sent upon the earth, gradually diminished the waters by evaporation. They decreased by and by and withdrew into the places from whence they had gone forth. The sea regained its bed, and the clouds reformed themselves into atmosphere. On the twenty-seventh day (according to the Vulgate, or the seventeenth, according to the Hebrew and Samaritan texts, the Targum and several ancient versions) of the seventh month, the ark rested on Mount Ararat, in

Armenia. The decrease of the waters continued until the beginning of the tenth month. On the first day of this month the summits of the mountains appeared. Forty days later Noah, desirous to know whether the surface of the earth was dry, opened the window of the ark and sent forth a raven, which did not return. He also sent forth a dove, which, not finding where her foot might rest, returned. Seven days afterwards he again sent a dove, and in the evening she came back, carrying a bough of an olive-tree, with green leaves, in her mouth. At this sign Noah understood that the waters had entirely disappeared. After seven days more he sent forth a third time a dove, which did not return. Opening the covering of the ark Noah saw that the face of the earth was dried. Then God commanded Noah, together with his family and animals, to leave the ark. The duration of the Deluge was one year and eleven days. Or, as the months refer, in the biblical account, to the lunar year, the total duration of the Deluge corresponds to a solar year of three hundred and sixty-five days. The saved patriarch offered to the Lord a sacrifice of thanksgiving. Jehovah was pleased with its odor and promised to punish guilty mankind no more by the waters of a deluge (Gen. viii. 1-22). God blessed Noah and his children, concluded with them a covenant, and chose the rainbow as a visible and perpetual sign of His promise to submerge the earth no more by a flood similar to that which had taken place (Gen. ix. 1-17).

The modern critics see in the biblical narrative, which we have rapidly analyzed, an awkward combination of two different and contradictory accounts of the Deluge, the one Elohist and the other Jehovist. To believe them, the difference between the documents follows evidently from the contradictions, the repetitions that it is easy to remark therein, from the particular style of each source, and especially from the use of the divine names Elohim and Jehovah. The Elohist account is complete, whilst the Jehovist has reached us only in fragments.

These conclusions do not carry the evidence that is attributed to them, and the critical analysis of the narrative of the Deluge is far from being as certain as is pretended. The Elohist parts do not constitute a complete whole; they present breaks and are not free from repetitions. Notwithstanding its repetitions, the present narrative forms an harmonic and progressive whole, and the repeti-

tions, by insisting on the principal circumstances, define them the more and are very striking in their effect. Besides, they are conformable to the customs of the Hebrews and to the ample and redundant accounts of the Orientals. The cuneiform legend of the Deluge, of which we shall speak very soon, and which offers no trace of Elohim and Jehovism, has the same repetitions and contains the features which are declared to be peculiar to the two original documents. The biblical narrative is the work of a single compiler, who, if he did employ anterior sources, has molded them into a remarkable unity.

II. HISTORIC REALITY OF THE DELUGE.—The Biblical Deluge is no astronomical myth; it is a fact whose historical truth is evident from the Mosaic account alone. This account reproduces the Hebrew tradition of the remembrance of the cataclysm. But for this fact we have other proofs, which have been providentially brought to light in a time when the biblical narrative is most vehemently attacked.

Diluvian Traditions. 1. *The Chaldean Tradition.*—There exist, outside of Genesis, many diluvian traditions. The most important, and the one that approaches nearest to the Mosaic account, is the Chaldean tradition, of which we possess two versions unequally developed: that of Berosus, preserved by Eusebius (*Chron.*, i. l., c. iii.), and that of the poem of Gilgames, deciphered in 1872. According to the interpretation of Berosus, under the reign of Xisuthros occurred the great flood whose history is related in the sacred monuments in the following manner: "The great Deluge took place under Xisuthros. The god Ea appeared to him in a dream, and announced that on the 15th of the month Daisios (a little before the summer solstice), all men should perish by a flood. He was therefore to collect all that was consigned to writing, and bury it at Sippara the city of the Sun. There, he was to build a vessel and to enter into it with his family and dearest friends; and he was to cause animals, birds, and quadrupeds to enter it with him, taking sufficient provision. He was, moreover, to prepare everything for navigation. And when Xisuthros asked in what direction he should steer, he was told: "Towards the gods," and he was enjoined to pray that good might come of it for men.

"Xisuthros, on this, obeyed, and constructed a vessel five stadia long (3,033 feet 9 inches) and two broad (1,213 feet 6 inches);

and having brought together all that had been ordered, went into it with his wife, his children, and his intimate friends.

"The Deluge having come, and soon going down, Xisuthros loosed some of the birds; but these finding no food, nor place to alight, returned to the ship. A few days later he again set them free, but they returned, their feet stained with mud. Sent off a third time, they never came back. Xisuthros from this understood that the earth was bare, and, having made an opening in the roof of the ship, saw that it had grounded on the top of a mountain. He then descended with his wife, his daughter, and his pilot, and having worshiped the earth, raised an altar and sacrificed to the gods. At the same moment he vanished, with those who accompanied him.

"Meanwhile, those who had remained in the vessel, finding he did not return, descended and began to seek him, calling him by name. But they saw Xisuthros no more. A voice from heaven, however, was heard, commanding that they should be pious towards the gods, and telling them that he had received the reward of his piety, by being carried away to dwell henceforth in the midst of the gods, and that his wife, his daughter, and the pilot of the ship, shared the same honor. The voice further said that they were to return to Babylon, and dig up the writings buried at Sippara in order to transmit them to after generations. The country in which they found themselves was Armenia. They, then, having heard the voice, sacrificed to the gods and returned on foot to Babylon. Of the vessel of Xisuthros, a portion is still to be found in the Gordyan Mountains in Armenia, and pilgrims bring thence asphalt which they have scraped from its fragments. It is used to keep off the influence of witchcraft."

The other version, which is still more interesting, is written on cuneiform tables exhumed from the library of Assurbanipal, at Ninive, and preserved in the British Museum, at London. These tablets were copied in the seventh century B.C., from a very ancient copy, which came from Erech, in Chaldea. The date of the original is unknown. However, George Smith makes it go back to at least seventeen centuries B.C. The account of the Deluge is only an episode of an epopee in twelve cantos, which relate the exploits of the hero Gilgames. There is a picture of him on the eleventh tablet and it constitutes the eleventh chant, which

exists almost entirely. Gilgames had gone to his ancestor, Samas-napistim, in a far-away country and difficult of access, whither the gods had transported him to make him enjoy an eternal happiness. Samas-napistim relates to his grandson the history of the Deluge and of his own preservation. The city of Surippak on the Euphrates was already very ancient, when the gods resolved upon a deluge. Ea revealed his design to Samas-napistim and ordered him to build a vessel, whose dimensions he indicated to him, and he suggested to him the answer to give to the questions of the inhabitants of Surippak. Samas-napistim was to tell them that he wished to fly before the wrath of Bel, who soon would inundate the country. The vessel completed, Samas-napistim offered a sacrifice, gathered together his riches and made to enter into the ship his servants, male and female, the cattle of the fields and seeds of life. As soon as the rain fell, he himself entered into the vessel, and shut its door. The storm raised by the gods was so frightful that they themselves were scared. Mankind became again the slime of earth. The wind, the deluge, and the storm reigned seven days and seven nights. On the seventh day, at dawn, it stopped raining, the sea became quiet and the wind calm. The light having reappeared, Samas-napistim beheld no land; the whole was a watery desert. His vessel was stopped by the mountain of Nizir and could not pass over it. After being seven days thus anchored, Samas-napistim sent out a dove, which went, circled about, and, finding no place to alight, came back. A swallow did the same. A raven did not return. Then Samas-napistim sent out the animals in the vessel and offered to the gods a sacrifice of an agreeable odor. Bel was filled with anger against the gods because Samas-napistim had been preserved. Ea reproached Bel for his passion and advised him to punish in future only the guilty, instead of sending upon earth a universal deluge. Bel becoming appeased, made to enter into the vessel Samas-napistim and his wife, blessed them, conferred upon them immortality, and made them to dwell "at the mouth of rivers." (See George Smith's *Assyrian Discoveries*.)

This legend presents, with the biblical account of the Deluge, numerous points of contact. The resemblances existing in the general progress of the narrative, in the order of composition and sometimes even in the details of the style, render the relationship of both

documents unquestionable. Notable divergences, however, are apparent. Without speaking of the polytheistic and mythological character of the Chaldean poem, the latter has been composed among a maritime people and carries the imprint of the morals and customs of the inhabitants of the Persian gulf, whilst Genesis describes the Deluge for a continental people. If the analogies prove the community of foundation, the divergences, which are characteristic, establish the peculiar individuality of both accounts. As to the original relations of both traditions, the critics are not in agreement. Some admit the dependence of both documents, Hebrew and Chaldean, or at least of the two traditions which they represent. In the eyes of certain rationalistic critics, who lower the date of the Pentateuch, the account of Genesis would be a direct and quite late borrowing from the cuneiform poem; it would be only a purified edition thereof, an adaptation to the religious ideas of the Hebrews and a monotheistic and much abbreviated transformation. The borrowing, if there was any, did not take place in a recent epoch, and it is not the work of one man, but the work of several generations. The transformation of the Chaldean legends was done by the Hebrews in their popular tradition before the account was reproduced in the biblical documents. "Nothing prevents us from asserting that the history of the Deluge had been known to the ancestors of Israel during their sojourn in Mesopotamia, and that it had been preserved, becoming modified and purified, among the descendants of Abraham until the moment when we find it fixed in the biblical texts." (A. Loisy, *Les Mythes Chaldeens de la Creation et du Deluge*, p. 93.) But other critics acknowledge with more probability in the Chaldean legend and in the Mosaic narrative two parallel accounts, sprung from a common and primitive tradition more or less faithfully preserved. They represent two independent forms, national and localized by the Semitic tradition. They are *sister* traditions, which, under the empire of physical and moral, ethnical and geographical causes, have become diversified. The mother tradition has been better preserved in the account of Moses than in the Babylonian document, where it became disfigured by the mythological alterations.

2. *Other Diluvian Traditions.*—Traditions in regard to the Deluge are found among most of the nations. All of them bear a likeness to the account of Genesis, but with divergences of views

which have given rise to three different interpretations: (1) According to one, the diluvian tradition is universal, and all the nations have kept the remembrance of the Noachian Deluge. The existence of this remembrance has already been proven among the most of them, and if a nation seems to have this no longer, it is because it has not yet furnished all its traditions, or because it has lost that of the Deluge in consequence of migration, mixture with other populations, or on account of some other historical circumstance. Now all these diluvian traditions are more or less mutilated fragments of the sole and true primitive tradition. The transformations which they have undergone are explained by the local adaptation of the cataclysm, and were produced by restriction. The event, general and universal as it was, became local, particular, and restricted. (2) A critical and scientific study of these remembrances of the Deluge enables us to distinguish the real diluvian traditions, which have reference to the Noachian Deluge, from the pseudo-diluvian traditions, which have reference to local inundations. The really diluvian traditions are either original and aboriginal, that is, having their origin in the countries where they are preserved and peculiar to the peoples that hold them, or else imported by foreigners into the region where we find them, and consequently borrowed. Now, if the diluvian tradition is not absolutely universal, it exists in all the great races of mankind, except one, the negro race, among whom one has looked in vain for some trace. The Aryan or Indo-European races, Semitic or Syro-Arabic, Chamite or Cushite races, have their own and have not borrowed from one another; among them it is primitive. The yellow race possesses it, but by importation. The American populations know it, but we cannot tell with certainty whether their traditions are original or whether they are of Asiatic or European importation. In the number of pseudo-diluvian legends, we can rank the deluges of Ogyges and of Deucalion, the great inundation (placed by the historical books of China) under the reign of Yao, and the legend of Botchica, among the Muyscas of South America. (3) Finally, other critics draw still more rigorously the conclusions from the critical study of the diluvian traditions, and end by acknowledging as really diluvian and aboriginal only the Chaldean tradition. It was imported from Mesopotamia, they say, its native country, into the neighboring countries; it became the stem and has brought forth

the Hebrew, Phœnician, Syrian, Arabic, Phrygian, and Armenian branches. The antero-Asiatic traditions are the only really diluvian; all the others are pseudo-diluvian traditions. Be this as it may, even if we reduce the really diluvian traditions to a minimum, the fact of the Deluge remains historically certain. Its historical certitude rests upon a group of real traditions, which have transmitted to us the remembrance of the great cataclysm that struck mankind at the beginning of history.

3. *Geology.*—The first geologists believed that in the strata of the terrestrial surface they had direct proofs of the submersion of the globe in a historical epoch, and they attributed to the Mosaic Deluge the formation of alluvial soils, which in consequence thereof they named *diluvium*. Their opinion is generally abandoned to-day. The contemporary geologists acknowledge that an inundation like the Noachian Deluge, which lasted only one year, could not leave on the soil traces durable enough to be recognized with certainty centuries after, nor characteristic enough to be distinguished from those of other foregoing inundations. The phenomena which their predecessors regarded as geological proofs of the Deluge they refer to anterior epochs, and explain them through the action of other causes. They have established, indeed, that there are several kinds of *diluvium*, and in each of them several layers due to different factors and referring to distant epochs. They have been produced by a long series of revolutions in which water plays an important, but not an exclusive rôle. The alluvial gravels, which constitute the *gray diluvium*, have been carried away from the mountains into the valleys by water currents more powerful than our existing rivers and flowing under other conditions of slope and level. The lœss is due to torrents formed of very heavy rains, which graded down the slopes and carried away fine clay and fragments of stone. The *red diluvium* is the result of alternatives of frost and thaw on the surface of a soil constantly frozen in its depths. (A. de Lapparent, *Traité de géologie*.) The *erratic blocks*, those immense rocks transported hundreds of miles from the mountains from which they had been torn, have not been rolled by the waters, for their angles are neither broken nor rounded, but have been carried along by the immense glaciers which in the Quaternary times covered a part of the globe. The caves and fissures of rocks filled with human and animal bones strongly cemented together and mingled with fragments

of the surrounding rocks were formed in the time when the excessive cold obliged the inhabitants of Europe to seek shelter in the caves. Their bones became heaped up with those of animals for whom these grottoes served as haunts, and the whole became soldered through the action of the water which infiltrated. The *bone caves* and the *osseous breccia* are not, therefore, any more than the diluvial grounds and the erratic blocks, certain proofs of the Noachian Deluge. However, geology, which does not confirm directly the existence of the Deluge, does not contradict it. It even shows its possibility, when it establishes the traces of considerable inundations in the Tertiary and Quaternary times. Therefore, the biblical Deluge cannot be declared unscientific nor impossible.

III. EXTENT OF THE DELUGE.—The biblical text presents the Deluge as universal; but this universality has been understood in three different ways, and the inundation has been held as universal: (1) As to the surface of the globe; (2) As to the earth inhabited by men; (3) As to the region occupied by only a portion of mankind. Hence there are three opinions in regard to the extent of the cataclysm: The first admits the absolute and geographical universality of the Deluge; the second its anthropological universality; the third its universality restricted to a fraction of mankind.

1. *Absolute and Geographical Universality*.—Most of the ancient ecclesiastical writers, fathers, doctors, theologians, and commentators, believed that the Deluge had been complete in the widest sense of the word, and that it had covered the whole earth. They gave to the Mosaic account the meaning which it presents at first sight, and they understood it to be an inundation which had submerged the globe and destroyed every animal and every man. The terms employed by Moses appeared to them as allowing of no other exception than that which they indicate, and which relate to Noah and his family. The absolute universality of the Deluge is described in Genesis in very strong and very precise terms, and the text is so clear that for centuries it has been understood in this sense. Nothing indicates that the universality of the cataclysm must be restricted, and the context, from the fact that it excepts Noah and that it excepts no other person, excludes all restrictive interpretation. God, in fact, had resolved to produce the Deluge in order to destroy all flesh that was under heaven. Representatives of every species of the terrestrial animals were gathered into the ark for the preservation

of the species upon earth. The waters inundate everything and cover the highest mountains. All flesh perishes, and the only living beings left are those which are shut up in the ark. God promised to Noah that there shall never be another deluge to destroy all flesh. Now, there have been since partial deluges, that of Deucalion among the Greeks and the great inundation of the Chinese. If the Noachian Deluge had not been universal, God, therefore, would have violated His promise. The pledge which He has given, the rainbow, can be seen in all countries. It is universal. Therefore, the Deluge, whose sign it is, must have been universal. In presence of such a formal text the objections drawn from physical sciences against the absolute universality of the Deluge have little value; and even if reason could not sufficiently solve them, the faith of the Christian would not be shaken. For God, Who had regulated all in view of a universal catastrophe, had power enough to realize effects which science is incapable of explaining. Besides, the difficulties which an absolutely universal deluge raises are not as strong as they are sometimes imagined, and it is not certain that the quantity of existing water was not sufficient for the general submersion of the globe, especially if we admit that the irruption of the seas on the continents did not take place everywhere at the same time, but successively covered all the countries of the world. The absolute universality of the Deluge is confirmed by a passage of the Second Epistle of St. Peter, iii. 6 and 7. The Apostle compares the Deluge with the universal conflagration which will take place at the end of time. Then the world will perish by fire as it perished at a former time by water. The comparison between the two catastrophes exists only under the relation of extent; it would be inexact if both had not the same universality. These exegetical arguments, joined to the unanimous interpretation of the ancients and the universality of the diluvial traditions, have determined some modern exegetists to admit that the Deluge covered the entire earth and destroyed all men and all animals.

2. *Relative and Anthropological Universality.*—Many commentators and theologians of our days believe that the Noachian Deluge must be restricted to the portion of the earth that was colonized when it took place. According to them, all men, except the family of Noah, were engulfed in the floods; but the inundation did not cover the whole globe nor destroy all the animals. The univer-

salinity of the Deluge is neither geographical nor zoölogical; it is only anthropologically universal.

This interpretation appears to them necessary in order to cut short the grave objections which zoölogy and physics raise against the absolute universality of the Deluge. The placing in the ark, which was proportionately insufficient, of all the animal species known to-day and of the provisions necessary for their varied nourishment during a year; the cares required for their keeping and for the providing of which there were only eight persons; the necessity for the animals that had come from different zones to accommodate themselves to a uniform temperature; the restocking of the entire globe, at a time when no traces are left of the migrations of animals peculiar to America and Oceania,—for instance, at a time in which the fauna has always been localized, and when certain animal species have never existed outside their respective zones; the preservation of the fishes of fresh water and of salt water in the mixture of rain and river water with that of seas,—all this causes insurmountable difficulties. On the other hand, in the domain of physics, we can hardly explain the production of the immense mass of water necessary to inundate the entire globe. The quantity of the water known is insufficient. Even without keeping account of the crevices and sinkings of the earthly surface, it needed, above the level of the sea, a volume of water of a depth equal to the height of the most elevated peak of the Himalaya, to the height of more than 29,000 feet. Admitting that there was sufficient water, the simultaneous submersion of both hemispheres would be physically impossible. Such a submersion would bring on a change in the atmosphere that would modify the conditions of life upon earth. To have recourse to the divine almighty power to explain these impossibilities is to multiply the miracles which the sacred account does not mention and which the principles of a wise exegesis do not permit us to introduce uselessly.

Besides, the text of Genesis can be interpreted legitimately by restraining the limits of the inundation. The general and absolute expressions, *all living flesh under heaven, all that exists upon earth; all the high mountains under the whole heaven* (Gen. vi. 17; vii. 19), must be understood according to the genius peculiar to the Oriental languages. Now the Orientals often employ the hyperbole, not only in their poetical writings, but even in their historical

books, and nothing is more frequent in the Bible than to designate determined countries by the words "the whole earth." The famine which reigned in the time of Jacob in the neighboring countries of Palestine and Egypt prevailed over *the whole earth* (Gen. xli. 54, 56, 57). The entering of the Israelites into Palestine causes fear among all the nations that dwell under the whole heaven (Deut. ii. 25), that is, among all the neighboring peoples. So also in Deut. xi. 25, and II. Par. xx. 29. All the earth that desired to see Solomon (III. Ki. x. 24) was only the part that had heard speaking of him. At the first Christian Pentecost, there were at Jerusalem men of every nation under heaven, that is, Jews of all the countries of the dispersion. The ancient exegetists remarked among the biblical writers the use of absolute and general terms to express particular facts (St. Jerome, *In Isaiam*, xiii. 5). It is, therefore, permitted to apply to the account of the Deluge in Genesis this method of restriction, which is necessary in other biblical passages. Besides, this account presents positive indications of restriction. The dove did not find where her foot might rest, for the waters were upon the whole earth (Gen. viii. 9). The traveling bird had evidently not run over the entire globe, and "all the earth" simply designates here the space which the dove had explored. Finally, in the interpretation of the biblical account, we must keep account of the subjective point of view of the narrator and readers. Now, Noah and his descendants, as well as Moses and his contemporaries, did not know the entire globe; their geographical knowledge was limited. The account of the Deluge, for a long time transmitted by oral tradition and finally consigned to writing, is conformable to their knowledge. It referred only to the country then known by them, to the mountains which they had seen, to the animals which surrounded them and of which they had heard. It is, therefore, legitimate to restrain the sacred text to the lands inhabited, and, in spite of contrary appearances, this restriction is not in contradiction with the narrative of Moses. As to the words of St. Peter, they would signify, if taken rigorously, that the earth was destroyed by water in the time of the Deluge, as it will be destroyed by fire at the end of time. However, the aim of the Apostle is not to compare the two catastrophes from the point of view of the extent, but only from the point of view of the certainty of the fact, and of the effects produced.

The restriction of the universality of the Deluge to the lands inhabited is not opposed to ecclesiastical tradition, which has not acknowledged without exception the absolute universality of the inundation. The anonymous author of the *Questiones et Responsiones ad Orthodoxos*, q. xxxiv., refutes some ancient writers who maintained that the Deluge did not invade all the earth, but only the countries which men inhabited at that time. Theodore of Mopsuestia held this opinion, as John Philipon, in the seventh century, tells us (*De Mundi Creatione*, l. i., c. xiii., in Gallandius, *Bibliotheca Veterum Patrum*, Venice, Vol. XII. 1778, p. 486). Cardinal Cajetan (*In Genesim*, viii. 18) excluded the summits of the highest mountains. In the second half of the seventeenth century, three Protestant writers taught the restricted universality of the Deluge. Isaac Vossius (*De Vera Ætate Mundi*) became the champion of this theory and answered the objections of George Horn (*Castigationes ad Objecta Georgii Hornii, et Auctuarium Castigationum ad Scriptum de Ætate Mundi*, Hague, 1569). Abraham van der Mill put forth the same opinion in a writing published later on (*De Origine Animalium et Migratione Populorum*, Geneva, 1667). His son-in-law, Andrew Colvius, communicated the manuscript of his father-in-law to Vossius, who addressed a letter to him: *Ad Andream Colvium Epistola qua Refelluntur Argumenta quæ Diversi Scripto de Ætate Mundi Opposuere*, Hague, 1659. An anonymous dissertation (*De Diluvii Universalitate Dissertatio Prolusoria*, 1667), attributed to George-Gaspard Kirchmeier, restricts the Deluge to all Asia, the only part of the world which men occupied at that time. In 1685 the works of Vossius and of Horn on the biblical chronology and the Deluge were examined by the Congregation of the Index. Mabillon, who then happened to be staying in Rome, was consulted on the subject, and, in the session of January 29th, 1686, he read his *Votum de Quibusdam Isaaci Vossii Opusculis*, published in his *Posthumous Works*, 1724, Vol. II., p. 59-74. Of the three points incriminated, he studied only the last, the only one contestable, namely, that which concerns the extent of the Deluge. He detailed the reasons that were favorable and unfavorable, and concluded that, according to his opinion, there was no danger in tolerating the view of Vossius, and that it is best not to censure it. When, however, the Congregation judged it wiser to condemn it, it had to strike at the same time the works of Horn. The Congregation kept account of the conclusions of Mabillon, and

by a decree of July 2d, 1686, condemned at once ten short treatises of Vossius and two of Horn. The motives of the censure are unknown. It may be presumed that the opinion of the Deluge restricted to the inhabited earth was not directly attacked, and that the decree prohibits only the reading of works of Protestant writers. Be this as it may. This opinion of the Deluge being restricted to the inhabited earth was taken up again, and is held by many Catholics to-day. Certainly it is maintainable and does not appear to be contrary to orthodoxy.

3. *Universality Restricted to a Part of Mankind.*— Other savants, among whom are some Catholic writers, restrict the Deluge still more, and say that not all men perished by the Flood, but that entire races, long removed from the theatre of inundation, were preserved. These races would be, according to several, those which had sprung forth from Cain, and only the descendants of Seth would have been struck by the Deluge. Some even believe that the populations outside the valley of the Euphrates were spared. This opinion rests upon the same reasons as the second, of which it is only a more rigorous application. It avoids the scientific difficulties which paleontology, ethnology, and linguistics oppose to the existence of a deluge which would have engulfed all men. A multitude of facts, becoming more numerous every day, permits us to affirm that since the Quaternary times man has occupied the four parts of the world, that he reached the extremities of the ancient world, and that he touched those of the new. Now the paleontologists do not discover, by the fossil bones of men, in the history of the races, the breaks or gaps which the Deluge would necessarily have left therein. As far back as the historic monuments go, one establishes the existence of white, yellow, and black races. The negro appears with his distinctive characteristics on the most ancient monuments of Egypt. Since the variations were produced slowly under the influence of the surroundings, "the most ancient races formed themselves, according to all appearance, in consequence of the changes our globe has undergone and of the first migrations." (A. de Quatrefages, *Histoire Generale des Races*, p. 169.) Linguistics confirm the conclusions of ethnology. The languages, if we admit their natural formation, would not have had time to become diversified from the time of the Deluge until the epoch when we see them all formed. The stretching out of the biblical chronology of the Deluge until Abraham is insuf-

ficient to explain entirely the established facts. Therefore, these facts justify the restriction of the Deluge to a portion of mankind.

Besides, this restriction can be perfectly reconciled with the account of Genesis. If, by the avowal of the followers of the anthropological universality, the expressions apparently so absolute, "all the earth, all animals," can be legitimately interpreted in a restrictive sense, the similar expression, "all men," in the same context, may be also understood of a portion of mankind, of individuals who inhabited the theatre of the catastrophe. To refuse to admit the restriction of the word *all* when there is question of men, when one admits it for the earth and animals, would be an inconsequence which nothing could justify. There are as many motives to restrict the universality to mankind as to the earth and animals. The moral corruption, which was the cause of the Deluge, was not absolutely universal, except in the country where Noah lived. The narrative of Genesis relates the facts according to the ordinary manner of speaking, according to which "all the earth" designates the country submerged by the waters; "all men" the inhabitants of this country. On the other hand, Genesis is not the history of mankind, but only that of the ancestors of God's people. For, in its narrative of the Deluge, it left out of its purview entire races descended from the sons and daughters of Adam and the other patriarchs. Its account of the Deluge, which besides has a well-marked local color, speaks no longer of these races and has in view only the inhabitants of the country where the facts occurred. Finally, by the avowal of all, the ethnographic table of the tenth chapter of Genesis is not complete and makes no mention of the yellow, red, and black races. These races undoubtedly derive their origin from individuals who did not belong to Noah's line. The Abbé Motaïs (*Le Deluge Biblique*, p. 301-33) believed that he had found in the Pentateuch traces of the survivors of the Deluge, and he named the Cainites, the Amalekites, the Sodomites, and the giant populations of Palestine, the Emim, the Zomzommim, the Avorim and the Horim. But these traces are hardly probable.

To this interpretation the defenders of the universality of the Deluge as to mankind object, not without foundation, that the biblical account contains various features which are directly and positively opposed to all restriction of the cataclysm to a portion of mankind. The man that God desires to destroy by the Deluge is

the man that He has created, and whom He repents of having made (Gen. vi. 5-8); hence it is all mankind and not merely a portion. Besides, Noah, after leaving the ark, is represented as the father and chief of all men that shall live after the Deluge (Gen. ix. 1, 19). Finally, the plan of Genesis does not necessarily eliminate before the sixth chapter the children of Cain and the other descendants of the patriarchs outside the principal line, which must be that of God's people. This lineage is completely isolated only at the beginning of the history of Abraham. To the third opinion, one also opposes biblical texts which are quoted from outside of Genesis, and which affirm that all men perished in the cataclysm. But *the hope of the world fleeing to a vessel, which was governed by thy hand, left to the world seed of generation* (Wis. xiv. 6), may be understood of Noah, father of the postdiluvian men, even in the hypothesis of other surviving races. *Noah was found perfect, just, and in the time of wrath he was made a reconciliation. Therefore was there a remnant left to the earth, when the flood came* (Ecclus. xlv. 17, 18). When our Saviour Jesus Christ compares the end of the world with the Deluge, which carried off, if not all men, at least all the voluptuous of the time (Matt. xxiv. 37-39), His comparison has reference not to the universality of the victims, but to the unexpected character of the Deluge and of the last judgment, and He only says: "In spite of the admonitions and certain signs, the contemporaries of Noah were surprised by the Deluge, which exterminated them all." When St. Peter speaks of the eight souls that were saved in the ark (I. Peter iii. 19, 20), his purpose was not to prove the necessity of universality of baptism, but its efficaciousness. He compares the water of baptism with that of the Deluge in so far as it saves, not in so far as it destroys; and he affirms that all the baptized will be saved as certainly as were saved the small number of souls that were contained in the ark at the time of the Deluge. When the same Apostle says that God did not spare the primitive world and saved only Noah, the eighth person, that is, seven other persons with him, bringing in the flood upon the world of the ungodly (II. Peter ii. 5-7), we can explain his words as referring to the world in the midst of which was living Noah, the preacher of justice. Therefore, these texts neither prove for nor against the ethnographic universality of the Deluge.

If to the third opinion is objected the unanimous accord with which the Fathers acknowledge the anthropological universality of the Deluge, its followers answer that we are permitted to deviate from the common sentiment of the Fathers in regard to this point as legitimately as to the subject of the geographical and zoölogical universality. They say, it is true, that the testimony of the Fathers in regard to the inundation of the globe and to the destruction of the animals does not constitute an ecclesiastical teaching, whilst it affirms the destruction of mankind as a point of faith, as a truth connected with faith, because it gives it as a basis to a certain type, to the figurative meaning of the ark, representing the Church, outside of which there is no salvation. The existence of the type is unquestionable. But it is not from the nature of the type that there is an equation between it and the antitype which it represents. A relatively universal fact may serve as type to an absolutely universal fact. The house of Rahab is considered by the Fathers as a figure of the Church, outside of which there is no salvation. The eight persons which were in the ark represented all the saved. The contemporaries of Noah, the only inhabitants of the country submerged, may represent all those who will be damned outside the Church, without the typical meaning of the Deluge losing any of its value. The relative universality as to men is therefore sufficient to maintain the truth of the type. The Fathers, it is true, support themselves upon the absolute universality of the destruction of men. However, they did not make this a necessary condition of the prophetic type; they did not expressly exclude the relative universality, and their manner of expressing themselves does not exclude it in an equivalent manner. Therefore, they have not authoritatively decided a question which did not propose itself to them.

If the third opinion cannot quote in its favor the authority of the ancients, it counts, however, many followers. It is not altogether new. Jerome Oleaster, a Dominican, admitted that the Cinites (Num. xxiv. 21) descended from Cain. Isaac de la Peyrere restricted the Deluge to Palestine. August Malbert, Fredr. Klee, Ch. Schoebel, Omalius d'Halloy, Motais, do the same. A great number of writers, without positively adopting it, hold it as maintainable and probable. If science should be able to establish by a rigorous demonstration, or by an ensemble of precise and convergent indications, the anthropological non-universality of the Deluge, we could admit that the

biblical account is not opposed to this view. But, up to the present, science has not established this fact, and we can satisfy its actual legitimate claims by removing further back the date of the Deluge. Therefore, it is not necessary to adopt the opinion which restricts the Deluge to only a portion of mankind. We would be constrained to do this only were the non-universality to become an incontestable truth, and we could do so, because faith does not teach anything to the contrary. Meanwhile, it is wise and prudent to adhere to the second opinion.

IV. NATURE OF THE DELUGE. — As long as people admitted the absolute universality of the Deluge, they believed in its miraculous character. A direct intervention of God was, indeed, necessary to explain the submersion of the entire globe, and the absolute universality of the inundation carries with it as the logical consequence a miraculous origin. The ancient exegetists might hesitate and fail to agree as to the precise point when the immediate action of God made itself felt; they were unanimous in acknowledging in the biblical Deluge a fact produced outside the ordinary laws of nature, a miraculous fact. But since they commenced to restrict the inundation to determined limits, either to the region which men then occupied, or to the countries known by the Hebrews, or to some particular land, it has appeared as an event provoked undoubtedly by a special intention of God, but realized by natural forces; as a fact providential in its aim, miraculous in its prophetic announcement, but natural in its mode of production. There is room, then, to ask whether the Deluge was produced by a direct intervention of God, or whether it has been the effect of physical causes merely directed by Providence.

The prophetic announcement of the catastrophe does not prove that the cataclysm itself was miraculous. Other events, announced in the Bible as divine vengeance, as exemplary chastisements, have been phenomena entirely natural in themselves. The destruction of Jerusalem, foretold by Jesus Christ with details more circumstantial than those of the Deluge, was nevertheless realized by natural and human agencies. All the prophesied facts are not miracles. In order that prophecy may be realized, God does not need to derogate from the natural laws; it is enough that, without affecting their regular functions, He directs them towards the end He has in view, and that the physical causes act spontaneously at the moment He has fixed. God certainly intervened, when He directed Noah to

leave the ark (Gen. viii. 15-17), and when he contracted with him a new covenant (Gen. viii. 21, 22; ix. 1-17). But we can maintain that His direct action did not make itself felt in the production of the inundation. Whilst the Chaldean legend of the Deluge makes the gods intervene in the very execution of the inundation, the account of Genesis, which shows God acting before and after the event, does not speak of His action in the realization of the cataclysm. It expressly indicates the physical causes which entered into play, a torrential rain and the invasion of the sea on the continent (Gen. vii. 11-12), without putting them into the hands of God. The progress and the decrease of the inundation are also presented as effecting themselves naturally (Gen. vii. 17-19, 24, and viii. 2-14). The whole course of the inundation is therefore described in Genesis as natural. The indications of the direct action of God in the realization of the Deluge, which some have believed they found in the account of Moses, are neither certain nor evident. The reading of the Italic version: "Intrabunt ad te," instead of "Ingredientur tecum" (Gen. vi. 20), according to which St. Augustine (*De Civitate Dei*, xv. 27) made God intervene in the gathering of the animals, does not correspond with the original text, which simply announces the fact, without indicating the mode of its execution. The Vulgate shows God shutting the door of the ark (Gen. vii. 16); the Hebrew text says only that "God shut Noah in." This may simply mean that by His providential action God did not permit anybody, outside the family of Noah, to find a refuge in the ark. Mute as to all miraculous action, the biblical text is absolutely formal in favor of natural causes of the inundation. From this we may conclude that, although providential in its end, the Deluge was an event natural in the mode of its realization. This conclusion would be certain, if it were shown that the inundation was localized within quite narrow limits, or that mankind was yet little spread. It loses much of its logical force, if men were already scattered in divers parts of the earth. In this case, the inundation seems to have surpassed the measure of ordinary catastrophes, and to have required the miraculous intervention of God, conformably to the general interpretation.

If the Deluge may be considered as a natural event, it is logical to seek to discover the mode of its realization. Investigations have not been wanting in this task, and the attempts at scientific

explanations may be classified, according to their tendencies, into four groups. (1) The cosmic theories appeal to a change in the position of the axis of the poles. The more or less displacement of the earthly axis would have had for an effect the diversion of all the oceans on the continents and the production of a gigantic bar of water which would have made the tour of the world, passing over the highest mountains. It is difficult to indicate an adequate cause for this sudden displacement of the earthly axis. Some have suggested the shock of a comet and the upheaval of mountains, which might have changed the value of the angle of inclination of the earthly axis on the plane of the ecliptic. (2) The adherents of the volcanic theories approach the Deluge with the recent catastrophe of the Sunda Isles, and explain the inundation by an upheaval of sea water, produced by the eruption of a volcano. (3) The holders of the orogenic theories connect the cataclysm with mountainous upheavals or to lowerings like that which swallowed up the Atlantides. (4) The seismic theory, supporting itself principally upon the scientific interpretation of the cuneiform legend of the Deluge, explains the inundation by a seismic force or earthquake, which took place at the bottom of the Persian Gulf and threw on the plains of Mesopotamia the waves of the sea. A terrible cyclone became united with the eagre, and the seismic wave and carried the ark from the city of Surippak, situated on the shore of the Euphrates, to the mountains of Nizir. It is impossible to tell which of these theories comes nearest to the truth. Each one of them has something in its favor and all have the merit of showing that the Deluge, which is historically certain, is physically possible.

CHAPTER XIII.

THE DESTINY OF MAN.

I. THE DESTINY OF MAN; TEACHINGS OF FAITH; AFFIRMATIONS OF PSEUDO-SCIENCE.—“The one who combats for the moral truth in this world of anguish and of sin is certainly stronger when he believes, that soon or late, a vision of peace and of happiness will take hold of his being. So, also, one who labors on the top

of a mountain is more courageous when he sees therefrom, through the rocks and snow, the hearth (the home) and the rest that awaits him. If a similar faith could rest upon a solid basis, mankind would attach itself to it as obstinately as the drowning sailor cramps himself to the life-buoy." These words of one of the most accredited chiefs of positivist science, Professor Huxley, express at once the negation of the immortality of the soul, and the irresistible inspiration of the human heart, which gives to nihilism a pitiless dementi.

The teachings of faith on the destiny of man and on the future life are contained in the following question: Q.—Why has God created you? A.—To know Him, to love Him, to serve Him, and thereby to obtain eternal life. The highest and most rational metaphysics answer as faith.

The desolate doctrine of total annihilation after death is found a little all over to-day, and under all kinds of forms, in certain so-called scientific books. Even atheism tries to introduce this doctrine into the text-books of schools. Strange and really monstrous thing to find formulas proper to initiate into nihilism the young child that would ask whither it goes after death?

One of the first vulgarizers of the contemporary materialistic school, called scientific school, Louis Büchner, has shown himself especially brutal in the negation of the immortality of the soul. "A spirit without a body," he said, "is as little conceivable as an electricity without a metal; the naturalist must therefore protest against the idea of an individual immortality; we cannot admit that the soul of a dead individual continues to exist; . . . it is dead never to come back." I hardly dare to repeat here his odious blasphemies against the Christian cemetery, this blessed field wherein germs the seed of immortality, that mysterious dormitory (*Koimeterion*), according to the symbolic expression of the religious faith, wherein so many beloved dead await the signal of awakening. Büchner sees in the veneration of the tombs only an attack on the common right, on the rural economy, on the free circulation of fertilizing matter! "The best thing, the most useful thing which man can leave of himself, when dying, is a great quantity of phosphate of lime, of rare and fruitful salts, destined to form a richer association of molecules and, thereby, to increase the well-being of mankind." Behold the scientific materialism in all its height, in all its splendor! (Cf.,

Kraft und Stoff.) This same Louis Büchner, in a more recent work, *Licht und Leben*, becomes more enthusiastic than ever for the metaphysics of atheism, for that "immanence of one sole and same eternally circulating force, under all the aspects in the universe; for those infinite whirlwinds of matter in which man is only an extremely small being, living for a few days on a grain of dust, and leaving nothing behind him. . . . Thousand heavens, thousand earths have already disappeared in the great night. One day, also, when our immense universe will be put to pieces, a new life will ferment, new swarms of suns and planets will rise, charged with new beings, which also will be a prey to misfortune; the atoms, the very ruins thereof, will leave no more traces than as if they never had existed."

These empty and sonorous phrases, these senseless theories, wrapped up here and there with scientific rags, seduce the masses and carry ravage into the souls. We might multiply the dolorous or sinister citations; but we prefer to reproduce, to refute a page of Strauss. No one but the master knew better to sum up the materialistic argumentation against the future life. It is stinging, indeed, to see this proud contemner "of the law and of the prophets" to avow that the sole idea of the eternity "gives him chills."

"The pretended arguments of the existence of God and the so-called immortality of the soul are generally considered as the most powerful religious bases; whence do we assume the right to contradict the appearance which sees the entire man going into death, and to perpetuate, in us, a part which we can notice nowhere? . . . The *Ego* of man is his body, which, after death, is destroyed by the corruption of the tomb, by the dogs, or by the vultures. . . . The so-called faculties of the soul develop themselves, grow and become stronger with the body, in particular with their most immediate organ, the brain; they decrease with the latter in old age. What is intimately connected with the corporal organ ceases to live after the destruction of the latter, just like a point ceases to be the center of a circle when the circumference exists no longer. Whoever is not stuck up with pride knows to manifest no pretension beyond this earthly life; the idea of an eternity gives me chills." (*Der alte und der neue Glaube*, ch. xli.)

Behold the positivist objection, the systematized nihilism, affirmed but not proved at all. It is easy, it is especially opportune to com-

bat it in following a method which modern science cannot refuse. For this purpose we only ask that one may look about one's self for a moment, to remember, to ask the inner sense, to open the eyes, to regard and see.

The Future Life and the Scientific Observation.—The body and soul are so distinct from one another, the life of the soul offers characteristics so neatly opposed to those of the organic life, that the death of the body cannot and must not in any manner entrain the death of the soul. Here some considerations somewhat abstract become indispensable, but they will be brief, easy to seize, and will form themselves under our eyes into concrete proofs, living in action; it will be easy to apply to the study of the survival of the soul the method of observation, even we may say of experimentation, which positivism itself cannot refuse.

The body comes from the outside; it forms itself successively of multiple and dissimilar elements; it is the product of the human propagation, of nutrition, and of assimilation; it constitutes, for the atoms which actually compose it, a manner of being purely accidental and temporary, to which succeed other forms, other manners of being. The physiologists of all the schools loudly affirm this, and in this they are right: the molecules of which our body is formed but lately belonged to the vegetable or animal kingdoms which serve as ordinary nourishment to man, and within a short time they return into the circulation of the earthly dust.

The soul on the contrary, is and can be only the immediate product of a creation. Before being the *Ego* it has never been anything else, and it will never be anything else but the *Ego*. It was not formed by an aggregation of foreign molecules; it cannot be dispersed like the material atoms of the body, because it is one, simple, indecomposable, spiritual; it is not a pure accident, a passing phenomenon, because it is substantial cause, always and absolutely identical to itself. The psychological observation, the testimony of the inner sense, prove all this with the same certitude as the most rigorous determinism applied to the study of the sensible phenomena.

Let us remark well, from the double point of view that occupies us, these first essential characteristics of the soul and the body, are not only distinct, but opposed to one another. On the one hand, exterior formation, continual variability in the composition and in the decomposition; on the other, absolute identity, total permanence

in the unity and in the simplicity. Here, one thing that passes, that flies, that grows old, that, in each moment, ceases to be what it was, that continually dies; there, something that perpetuates itself alive, integral, and which cannot continue itself otherwise than by its complete and actual existence. This is not all:

The body has only a natural and no personal individuality, absolutely like a plant, like the first arrived organism. It is passive, it does not possess itself, it is not *sui compos*.

The soul constitutes a personal and responsible being, a being in *itself* and by *itself*, which possesses and determines *itself*, having a neat and absolute individuality. The individual perpetuity is, therefore, its essence. Behold already, whoever does see, the immortality of the soul logically deducted and metaphysically expressed. In this sense, Leibniz was right when he said: "Man is naturally immortal." But let us continue:

The life of the body is a continual struggle against the physical and chemical laws, which push towards the disaggregation of the organic elements. Death or the decomposition of the corporal organism is, therefore, a more natural thing than life. A dam stops a torrent; break the dam and the torrent flows away by its proper weight; so also the body disaggregates itself by its own inclination, which always ends by carrying it off. We know the persevering but always inefficacious effects of science to embalm the bodies, to preserve somewhat its forms and colors, to retain atoms which life came to abandon, and which an irresistible force must return to the continual circulation whence they have gone forth.

On the contrary, if there is question of the soul, it is the life that is the proper of its nature, its death would be a prodigy, something inexplicable. The death of the soul can realize itself, can conceive itself only through the annihilation. Now, the annihilation of any substance is a supernatural fact; the positivist science itself declares this as naturally impossible. The death of the soul, a real and personal substance, can, therefore, be in no manner the consequence of the natural death of the body.

I shall not insist any farther on these metaphysical considerations, on these somewhat abstract reasonings. Fortunately that it is easy to prove them in action, to follow the spectacle of the two parallel lives: the one, that of the body, which progresses, expands, de-

clines, falls, and disappears; the other, that of the soul, which also progresses, but never arrives here below to the complete expansion, which is always separated from the ideal by an abyss, which seems to commence its course, hardly to enter its destiny, when the body, erect with strength, becomes weakened and abandons it.

This spectacle, so attractive by itself, will appear this still more, if we remember that there is question of ourselves, that it is our own history, past, present, or near, which I am going to relate.

Behold a child, see a man that happens to be born; he is there in his cradle; the eyes are yet closed, the lips dumb; but we know that in the center of this rising bud, under this frail envelope, a soul is resting. Soon all awakens and the eyes are opened; we understand already that these eyes are the regards of a spirit. The lips smile and know to speak, even before being capable of articulating any sound. Finally, the button bursts, the soul manifests itself, the body agitates itself, the human being is erect, it has commenced the course of life.

Both the soul and the body put themselves into march like two joyful and faithful companions; very unequal by nature, humor and tastes, and nevertheless connected, entangled with one another, forming a unique compound, in wrestling sometimes, very often dupes or accomplices of their mutual infirmities.

The childhood, the youth, the ripe age pass; the union and harmony of the forces seem to persist; one might believe that both the body and the soul were made to attain the same end, the same destiny never to quit.

However, some strange symptoms manifest themselves. A moment arrives when we are astonished, when we are grieved to discover in these two parts of the same being different or even incompatible aspirations. They no longer seem to be made for one another; we might say that they are the sad preludes of a divorce.

The one, the soul, insatiable to be, does not only feel itself not tired of living, but it becomes greedier for this the more the moment of departure approaches. It is more vigorous, that is, it possesses more knowledge, a more powerful will, a higher and broader ambition than ever. What is the use of the little road it has run through? it has discovered the infinite, it has recognized its domain, and will have no rest until it feels itself near it.

The other, the body, fifty, sixty years of march have rudely tried it; it may try to bear up to second and to follow the soul which presses it and drags it along; it feels itself attracted towards the lower, towards an incline smooth at first, but inexorable. It is done, it will cease no longer to go down and to tend towards the rest; and the other ascends, always ascends to live.

The time, which is the great workingman of death, of decomposition, that weighs upon the body to crush it one day with its weight alone, without any other accident, the time, in throwing down all things, seems to disengage it from its strings and to prepare all for a last flight. The famous chemist Davy, whose genius liked to elevate itself at the sight of grand scenes of nature, wrote a learned and poetical meditation on time, the cause of all ruin of perishable things. He makes us admire the pointed peaks, the unchangeable needles dominating the mountain chains, after the tempests, the rimes and the centuries have gradually disentangled them from the more friable rocks that covered them; the granite shows itself naked and seems to defy the genius of destruction. The granite, here, is the soul; according to the measure as the body falls like a useless garment, the indestructible peak arises and shows itself in all its nakedness.

In material nature, the most powerful agents, the unperceived but sovereign forces, relentlessly concur to the work of time: destruction and reconstruction, universal evolution. That what resists to lightning, to the waves of the ocean, to the shocks of earthquakes, underlays to the ceaseless action of the dew, of the raindrop, of the molecule of vapor. This is the history of the human body. But when there is question of the spiritual soul, all its forces, all its faculties, all its acts; the thought, liberty, love, and science, are witnesses and agents of life; all of which it nourishes itself, the true, the beautiful, the good, are nourishments and pledges of immortality.

Let us come to the end, to the last act, to the inevitable *dénouement* of the drama of life, of the dialogue so diversely unequal between the soul and the body. We have started from the cradle, behold, we are at deathbed; it is again a cradle with quite different and profounder views and with longer hopes.

Behold a man of intelligence and of talent, and, if you wish, a man of genius that comes to die. We might give him many known names that would justify what we have said. We see an

enfeebled body, broken down under the threefold action of labor, age, and sickness; death has already placed its icy fingers upon each of his members. A feather, a leaf of paper would be a too heavy a weight for that hand which has even no longer the strength to tremble like the hand of an old man.

And, at the same time, we see the spirit, the intelligence, the soul which has preserved all its strength, all its life; what do we say, they are *éclans*, flashes of lightning, manifestations more radiant than ever. Have we not seen wonderful pages, master-works dictated by dying men? Herder, dying, said to his son: "Suggest to me some great thought: this alone gives me a little strength."

What! this so luminous soul, made to know and to wish, should follow the destiny of the body, and all on a sudden, without a symptom of decay or of weariness, to cease to know and to wish! . . . This body deprived of life preserves yet for some time its heat, its form, the imprint of its grandeur, we might say the imprint of immortality which it holds only from the soul, and the quite alive soul, in a twinkling of the eye, would be reduced to nothing!

A less rare spectacle and quite as eloquent, more eloquent perhaps than the spectacle of the genius, is that of love, of tenderness; that is, of a soul quite burning in an already cold body. The heart almost beats no longer; but a hearth of inner heat, the hearth of love, is more kindled than ever. Here all description is useless. Who has not seen with his own eyes, who did not feel himself moved, affected, crushed, by the excess of life of a loving soul in an agonizing body? And who, therefore, could ever believe that a soul made to love was destined to cease to be, to cease to love in the very moment when it loves the most?

And the spectacle of sanctity, which sums up and comprises all the rest; a saint at the moment of death, on the threshold of eternal life! . . . Here again, an enfeebled body, exhausted through fatigue, through devotedness, through the sacrifices, stretched out upon ashes and hardly distinguishable from the ashes, or mutilated, torn by the hand of a hangman, the crushed bones, the flesh half devoured by the wild beasts of the circus! And the guest that dwells inside, the soul showing itself uncovered, to intone a chant of life, of triumph, to command to the hangman, to the lions, to pain, to death itself! Whoever saw a saint dying beheld with his own eyes, has contemplated the future life.

Future Life and the Conception of the Visible Universe.—In a

letter addressed by Charles Darwin to a young student of Jena, and whose posthumous publication produced quite a lively emotion, the famous author of *The Origin of Species*, "old and sick," declares that "the habit of scientific inquiries renders a man hard to please in fact of proofs. . . . "In regard to future life, he adds, "everyone has to decide for himself between vague and contradictory probabilities." Two eminent mathematicians and physicians, whom the habit of exact sciences has certainly rendered "hard to please," proposed to raise "these vague and contradictory probabilities" to the state of scientific truths, to prove by purely physical speculations the possibility and the reality of a future immortal life.

Conforming themselves to the rules of the severest determinism, Messrs. Tait and Balfour Stewart penetrated until the limits of pure thought, unto the extreme confines that separate experimental science from metaphysics and theology, and there, without leaving their domain, in virtue of a principle universally accepted by modern science, in virtue of the principle of "continuity," in the succession of the phenomena, they strongly bind the present order to both a past and future state; they cast the anchor into this invisible universe which preceded the actual universe, which co-exists with it and which will survive it.

The authors of *The Unseen Universe* tell us themselves, on the very first pages, that they are neither metaphysicians nor moralists, and much less theologians; they are physicians and mathematicians, and treat the future life in a scientific manner. "Science, loyally developed, far from being an adversary of Christianity, becomes its most efficacious support. Science and religion are not, and cannot be two fields of knowledge without possible communication between one another. A similar hypothesis is simply absurd. There exists undoubtedly an avenue leading to both. Unfortunately this avenue has been walled up with the bill: *Forbidden to pass here.*" Their end and their hope is to throw down this wall of separation.

The demonstration of Messrs. Tait and Balfour Stewart is entirely in the following syllogism:

The principle of Continuity, the foundation of modern science, requires the continuation of things, because nothing is annihilated.

The continuation of things, which it is impossible to prove in a scientific manner in the actual universe, which must necessarily end, requires an invisible universe that succeeds to it.

Therefore, the fundamental principle of modern science requires

and proves the existence of the invisible universe, of a future life which continues the actual life of man.

One can, undoubtedly, discuss similar theses, and one cannot deny their importance and grandeur; neither can one deny the powerful attraction of these questions which "touch us so profoundly," pursued with the vigor of enthusiasm and with the surety of view which is given by the well-understood science.

Future Life and the Idea of God.—It is useless to-day, for so many minds in the habit of looking for the laws in the observation of the facts, to present the great problems of life and of the destiny under a sensible form. The first philosophers converted to Christianity, and having become apologists of their faith, in writing for the learned pagans, for the Diogenes and the Autolycus, knew to conform themselves to the habits and to the intellectual aspirations of their time. It was always thus in the course of time; this is one of the most fruitful teachings of tradition. But this does not mean to say that in these grave matters, when there was question of fundamental truths, we must abandon or neglect the great proofs that have nourished, consoled, and strengthened the faith of our fathers, who have lightened our rising reason, who have prepared our conviction against all trial, and will guard it against all decay.

An infallible light, the moral conscience, the idea of the eternal and sovereign justice, shows us the reality, the necessity of the future life, of the life of the soul separated from the body, as surely as the light of the sun reveals to us the existence of material worlds. Let us listen again to one of the great vulgarizators of contemporary nihilism: "The molecules of iron that were beating in the temple of a poet, or that were thinking in the brain of a philosopher, that were acting under the breast of the most barbarous tyrant, or suffered in the heart of the most innocent victim, now perhaps devour the space in the wheelwork of a locomotive." Of vice and of virtue, of acts of devotedness or of barbarity, of the criminal or of the hero, of the persecutor or of the martyr, behold all that remains for the materialist! We must not be astonished if others have added since: "To what use?"

"The proud Cæsar, dead and changed into clay, perhaps to-day stops a crevice to repel the wind;

Ah! the mortal who formerly filled the world with terror,
Stops the hole of a wall to keep away the rigors of the winter."

One remembers and applauds these words of Shakespeare, be-

cause they seem to express, more poetically than anything else, the thesis of annihilation. But if Julius Cæsar, of whom there remains only a little clay in the crevice of a wall, called himself Nero or Domitian, when he caused to be dragged before his tribunal thousands of innocent victims, when he tore them with iron rods, when he outraged them, butchered them, because they wished to remain Christians, or simply honest? . . . These things repeated themselves in various ways at all times and in all countries; there have been, and there will always be, wicked oppressors, innocents oppressed, monsters and angels under the human form, and they, like the others, should return entirely into the universal circulation of matter, and all should be finished!

What we are going to tell is not a blasphemy, on the contrary, it is the cry of faith that blasphemy irritates; it is an act of adoration. For anyone that knows what the world has been, what it is, what it will be, there is no middle between the terms of the following formidable dilemma: either we must believe in a just sanction in a future life, or we must repeat with the terrible and well-known logician, who said: "God is the evil."

If the whole human harvest, the tare and the wheat, should be laid some day, buried forever in the same furrow, it would be true to say: "God is the evil."

If to so many sighs, to so many stifled tears and prayers, to so much blood spilt and sacrifices lost, to the many injustices, infamies and unpunished cruelties, must succeed a silence of death, an eternal silence, if the same winding sheet must wrap up all, "God is the evil." I do not blaspheme, O my God! I believe, I proclaim and try to revenge Thy outraged justice.

The savants are quite in accord to admit that our satellite, after having been an incandescent globe, gradually cooled itself; perhaps even, during a certain time, it could give shelter to life, then continuing to become cooler it became a sterile and dead mass, preserving only that melancholic and mild light which it obtains from the sun, and which sends it to us. One day, undoubtedly, our earth, so verdant and so peopled, will become in its turn an immense glacier. Ah! we understand the beautiful words of the poet Richter: "When, after thousands and thousands of years, our earth shall have perished on account of old age and of cold, when all living noise shall be buried in its bowels, can it be that the im-

mortal spirit, that God the Creator, lowering His regards on that dumb globe, says to Himself in contemplating that great mortuary field: 'Upon this frozen earth, numberless shadows have lived, have weeped, doing the good or the evil; now all has vanished forever.' No, for the tortured worm would then arise and say to his Creator: 'Thou couldst not have created me to suffer (or to enjoy), Thou canst not be indifferent to vice and to virtue; Thou shouldst not be this, Thou canst not be this.' And the one who gives to the worm the right to speak thus, is the Almighty Himself, Who placed in us a spirit of justice and of goodness, and Who alone awakens in our souls the aspirations and the *élans* of hope towards Him."

It is with pleasure that we reproduce here such a noble protest against the nihilistic doctrine, in the name of morality, of social happiness and of the human dignity. It is an old proof eloquently rejuvenated. It was written quite recently by a man equally sympathetic by both his talent and honesty (but who is not yet a Christian), in a somewhat suspected collection of blind tenderness for religious or philosophical orthodoxy.

"I am none of those whom faith has touched; those who believe are happy, and I envy their happiness. . . . I affirm that for the nations, as for man, spiritualism is the life, and that materialism is the death. To give to the soul a transitory existence, to reduce it to the struggles, to the deceptions of actual life, to make it perish like matter that envelops it and which it illuminates, to forbid it to expect a reward, to interdict to it to dread a punishment; to promise to it the nothing, to render it inferior to the molecules of the visible world which transform themselves and never disappear, is to chase from man the divine breath and to condemn him to forced bestiality.

"I know only one belief and only one refuge," says George Sand: "the faith in God and in our immortality. . . . It is strange, it is almost painful of being obliged to defend these doctrines: they have made the glory of mankind. . . . Without them the peoples are only herds struggling for existence, according to the formula of Darwin, devouring one another, eating, enjoying, and then *perish*, instead of dying." (Maxime Du Camp, *Revue des Deux Mondes*, April 1st., 1883.)

Let us sum up. The soul exists, it thinks, it is free; therefore, it is immortal. When life, thought, and liberty are found united

in one and the same personal substance, this substance cannot be annihilated: the personality, the responsibility constitute in the face of death a double and sovereign warranty, in the name of reason and of eternal justice.

To pretend with the so-called scientific materialism, with contemporary monism, that the soul is only a phenomenon, an ideal product, a resultant of the movements of the human organism, is merely an assertion, not only a gratuitous hypothesis, but contradicted by intuitive evidence, by reasoning and by experience. Our soul desires, it feels itself cause, principle of free activity; it is, therefore, necessarily and by this a real and complete substance; it can and must exist independently from all other substance.

Not only does the soul survive the body, but it is immortal. Whither then, after this first victory, should it go to make shipwreck? If it is certain, as we have said to satiety, that even in the time, in the natural creation, no atom, no movement is lost, how could the substantial soul, after having crossed the times, be lost, disappear in eternity? One cannot get over the threshold of immortal eternity without partaking thereby in that immobility of existence: to be in the eternity, is to be immortal.

The soul is so little made to the measure of that what passes, of that what ends, that it adapts itself quite naturally to that what is eternal, that its instincts, its appetites, its aspirations here below overflow all parts. As soon as it perceives limits, it suffers like an eagle in an iron cage. I am not, I never shall be here below what I can be, what I must be; between the reality that presses me and the ideal towards which I aspire, there is the immensity. When the body feels the hunger or thirst, it becomes restless and cries out after these things; as soon as it has its fill, as soon as the flesh is contented, it awaits in rest the awakening of the appetite. There is not one single faculty of the soul that we can thus satiate, that we can withdraw for one moment from the attraction of the infinite.

We all know, whoever it may be, what sorrow is, because we all form a part of mankind condemned to die. We have seen the closing of the eyes whose regard had been the light and the joy of our life; we have seen half icy lips opening for a last time to tell us: *Au Revoir*. In separating ourselves from these much-beloved dead, by intrusting them to the care of the tomb until

the eternal rendezvous, did we not understand how deeply that sacred dogma of the immortality of the soul was rooted? Did we not understand that true and consoling thought of Petrarchus, what the senseless call death:

Quel che morir chiaman gli sciocchi,

it is the commencement of life, it is the dawn of the day that will have no night?

It is not enough to make, to penetrate this fundamental truth until the most extreme recesses of our heart, until the most inner depths of our conscience and to the marrow of our bones: we must loudly profess it, defend it, propagate it; we must show it patiently and strongly to those whose faith is in danger, and what an atheistic teaching seems "to condemn to forced bestiality"; we must tell them and repeat without truce. The destiny of man is to die in order to live, and not "to perish" to disappear in the nothing. We are souls, we are immortal.

The Future Life and the Resurrection of the Bodies.—The problem of the human destiny does not only comprise the immortality of the soul, but also the future life of the entire human being, that is, the resurrection of the body. A portion of matter will be anew and definitely informed, rendered alive by its personal union with the spiritual substance, with the soul. Such is the doctrine taught by faith; necessary supplement of the Christian symbol, it has been denied, combated, laughed at from the first centuries; it has always been victoriously defended.

Reason and philosophical anthropology support the teachings of faith. The body is an "essential element" of the primitive and divine plan. Man, the human compound, is the unique term in which the two other terms of the universe, the spirit and matter, actually unite themselves and must definitely unite themselves to constitute the perfection of the creative work. The resurrection, such as it is taught by Christian faith, is logically comprised in the idea of man, because the body is one of the "essential elements" of his nature; the integrality in the immortality of the human nature is at this price. The resurrection of the flesh enters as an "essential element" into the distribution of the supreme justice. The union of the body and of the soul is such, during the mortal life, that the free acts of man, good or evil, partake in the two natures. The identity of the person

before the judge, in the punishment and in the reward, cannot be otherwise understood, otherwise realized. The body is for man an "essential element" of complete beatitude; the horror of death, the invincible repugnance for the separation of the two partial substances, imply the desire and the necessity of the resurrection.

What can and what do experimental sciences teach us in regard to the dogma of the resurrection of the bodies? Evidently nothing. Even here we cannot conceive a possible application of the method of determinism. And nevertheless, among all the objections constantly repeated, there are some that present scientific appearances and thus seem to attach themselves to our apologetic program. We shall sum them up and we have to remark that, however ancient and sifted they might appear, their refutation presents, in our time, a particular interest: it permits to establish unexpected approachments, singular harmonies among certain presentiments, among certain bold hypotheses of modern science, or even of the most hostile science.

The first objection has been formulated in various manners. After the death of each man, the elements of which his body was formed become decomposed and enter the great whirlwind of matter; soon they shall form a part of new organisms, plants and animals, and, we may say, without having recourse to anthropophagy, they will not delay to circulate in other human bodies. All this happens even before death, in full life, because our body renews itself continually. In that infinite dispersion of atoms having belonged to thousands of human beings, how can we conceive the resurrection of the body of each one? In that universal whirlwind of molecules, what is the substance that will be given back to the soul, that which corresponds to the years of childhood or of youth, of ripe age or of old age, because it has been so often and so completely renewed?

Behold a deemed formidable difficulty; it is specious at first sight, and childish at the bottom. The more one will try to increase it, the more one will insist on the continual circulation of the living atoms, and the more one will try to prove the simplicity of the solution, it will be better to make one understand that the identity of a living body does not depend at all on the identity of the material elements. The principle of the identity of the human body, is its personal and permanent union with one sole and same soul; its unity as living body is thus maintained in spite of the continual evolution of the molecules of which it is composed.

"There cannot be the least doubt," said Mgr. Freppel, "on the individual identity, no more than that of the plant or of the animal, although both preserve no longer, at the end of a certain time, a single one of the molecules that formerly formed part of their substance. . . . Why should the risen body be more identical to the body destroyed by death than this body had remained identical to itself through the different phases of its mortal life? . . . Faith is not interested at all in these scientific hypotheses, for the Church has not defined in what precisely consists the specific and individual identity of the bodies. The object of the dogma is the resurrection of man with *his own body*, according to the expression of the Fourth Council of Latran; outside this, the field is open to the liberty of the opinions." (*Les Apologistes chrétiens au deuxième siècle*, p. 192; Origen, Vol. II., p. 45.)

A second objection presents itself under a less superannuated form, without being neither more serious nor more scientific. The immortality of a living body is impossible; every organism, thereby alone being endowed with life, must "perform evolutions," grow, decrease, and end. Immortality supposes immutability, permanence, absolute persistence of the whole and its parts, which is in opposition with the idea of organic life, with the idea of decomposition and of reorganization, of continual destruction and "creation." Every animated body supposes a system of functions characteristic of life, essential to life; now, of two things one: either the actual organs, whose ensemble constitutes the human body, will be struck with sterility, will become useless and ridiculous, or the life of the resurrected bodies will be such as we know it, that is, perishable. . . .

We have shown how the most ancient difficulty concerning the resurrection was an effect of the ignorance about the principle of identity of the living bodies. Our ignorance is still more complete in regard to the very essence of matter, in regard to the essence of organic life. "The substance of the bodies actually manifests itself by sensible molecules; but can it not exist independently from these molecules? Among the physical and chemical qualities there is a permanent and essential *substratum*, which is repugnant in nothing to the idea of perpetual and immortal life. . . . It would be sufficient to modify the laws of attraction to be able to reduce the material universe to a mass of as small a dimension as one might

like to do. . . . Who knows whether the whole matter of which the worlds are formed will not be one day united to the souls and rendered participant in the immortality? What infinite views in the words of Ritter: 'The worlds, in their perpetual revolutions, seek perhaps the place and condition of their eternal rest;' and in the thought of St. Thomas of Aquinas: 'Nothing moves for the sake of moving, but to arrive; all these movements will cease;' and finally in the words of St. Peter, so wonderfully verified and confirmed by modern science: 'There will be new heavens and new earths!'"

But, aside of these considerations of a too elevated order perhaps, although very legitimate, we do not see how the nature of organic life, such as it has been determined and formulated by positive physiology, opposes itself to the idea of immortality. Nothing hinders, indeed, to admit in the resurrected bodies an evolution of atoms, a continual variety of material elements, an eternal "renewal." The personal union of the soul that has been sufficient to reconstitute the identity of the body, will be sufficient to perpetuate it, in spite of the continual changes of the molecules. That living whirlwind, that celestial whirlwind, will harmonize itself wonderfully with the idea of glorious bodies such as Revelation permits us to conceive it.

These harmonies, often unexpected, of the teaching of faith, not only with the presentiments of positive science, but also with the boldest hypotheses of the more "advanced" science, are numerous; nothing is neither more attaching, nor more proper to provoke the meditations of the apologist. Thus:

The cosmic evolution: the end of the actual and visible universe, the solar systems devouring one another; the indestructibility of matter, the worlds transforming themselves in a perpetual exchange of youth and of sensibilities; new heavens and new earths. The biological evolution: the cell, the organic atom, preserving, with the imprint of an indefinite part, the creative and directive idea of an expansion without limits. The germ of life is able to pass, without being struck with death, through the glacial space or incandescent nebula. The evolution of humanity: the indefinite progress preparing a superior mankind more and more independent from unconscious matter, more and more mistress of force, a real transfiguration of the earthly life. . . . How many golden ves-

sels can we remove from the false gods of science to adorn the altar of the true God? How many altered oracles? What a revealing exegesis, addressed to unbelievers, does the text of the Scriptures not contain on the resurrection of the bodies! (*Cf., Apologie Scientifique*, by F. Duilhé, pp. 445-477.)

CHAPTER XIV.

BIBLICAL CHRONOLOGY

WE do not find in the Bible a complete Chronology, nor a fixed era or epoch at which the numeration of the years commences, and in this sense we can say, repeating the words attributed to Silvestre de Sacy: "There is no Biblical Chronology." But there are in the Scripture some figures, dates, chronological accounts, which may serve to form a system of biblical chronology. It is the same with the Egyptian monuments, which only indicate the years of a reign, with the help of which the chronologists calculate the times of Egyptian history. We have therefore as much right to speak of a biblical chronology as of an Egyptian chronology.

But the Bible does not contain an ordinary history: it is the work of God; it has been written under the inspiration of the Holy Ghost. Hence we may ask whether the biblical chronology is inspired and whether it forms a part of the divine revelation. Certainly, the sacred writers have written, under divine impulse, some dates, and furnished chronological accounts which were inspired by God, and consequently exact. These teachings, which formed part of the divine revelation, would constitute a revealed chronology, if it were certain that the inspired authors desired to point out the age of the world and the regular succession of time in Israel, and that they have indicated all the necessary dates. Some, undoubtedly, had the design to fix chronologically the epoch of the events which they related; but not all took this care, and the chronographers establish in their writings many breaks or simple chronological approximations. The Bible contains, therefore, chronological accounts which are incomplete and insufficient to form a revealed and certain chronology. We

might arrange them systematically, but the calculation resulting therefrom would remain problematical and perhaps would be faulty; it would not enforce the assent of any Catholic, who would always have the right to discuss it and reject it. Moreover, all the figures of the Bible have not reached us in their primitive integrity, and the dates present themselves to us with such variations that criticism is unable to restore with any certainty the original text. This evident alteration of dates still further increases uncertainty of the chronological calculations. Furthermore, the Catholic Church never had an official chronology. She has always permitted discussion of the numerical variations of the sacred text and liberty of reckoning the duration of the biblical times. We shall set forth briefly the results obtained by the chronologists, passing successively over the principal epochs of the biblical history.

I. DATE OF THE CREATION OF THE WORLD.—The Bible does not fix it; it says only that God created heaven and earth "in the beginning," without fixing precisely the epoch of this "beginning." It also describes the primordial state of the terrestrial globe as a state of chaos, of confusion, and of disorder, during which dense darkness covered the surface of the confused elements (Gen. 1. 1, 2). It does not tell us what this duration was. Until the nineteenth century critics generally did not distinguish the date of the creation of the world from that of the creation of man, from which it was separated, they commonly believed, only by six days of twenty-four hours. Previously, however, some more perspicuous writers, such as St. Justin, St. Gregory of Nazianz, Gennadius of Marseilles, and Petavius, had admitted an indefinite period between the creation of first matter and its definitive organization. (Cf. Motais, *Origine du Monde d'après la Tradition*, c. ii., pp. 17-42.) The present interpreters acknowledge almost unanimously that Moses is silent as to the space of time that elapsed between the primitive creation and the production of the light on the first genetical day. Several even consider the days of creation as periods of an indeterminate duration, as may be seen in another chapter, and all concede to the astronomers and geologists the time necessary for the formation of the planetary bodies and the geological strata. Besides, science no more than exegesis possesses the means of estimating this time with precision and certitude. Certain time-gauges are wanting. However, geologists, in accord with astronomers, grant centuries to the stellar

phase of the earth, and it is a fact demonstrated beyond question that its planetary phase goes back to a very ancient origin. The earthly stratifications, the configuration of the continents, the changes of the flora and fauna, have required centuries. The geologists who venture to fix by figures the age of the world arrive at very different results. Their calculations, which start from different hypotheses, are based on the time necessary for the action of existing causes. But, whilst always identical in their essence, the forces of nature must certainly have varied in their mode of action. Their intensity has been more or less powerful, and their associations, more or less complex, have deviated in a large measure from the combinations at present realized. Hence we can admit only with great reserve the numerical results at which different savants have claimed to arrive. Reputable geologists do not believe they exaggerate in estimating at some millions of years the time necessary for the geological formations. According to this, the figures might vary from 1 to 20, sometimes from 1 to 100, without any one of the extreme results meriting less confidence than another. Hence, it would not be unreasonable to estimate between 20 and 100 millions of years the duration of the earthly sediments.

II. DATE OF THE CREATION OF ADAM.—The biblical times can be measured only from the appearance of man upon earth. However, the sacred text does not determine chronologically the origin of man in a formal and precise manner. Nowhere is it said: Adam was created at such a date. This date is the result of the calculation of all the chronological references contained in the Old Testament. Now, with the same data and employing the same processes, chronologists have arrived at very divergent figures. Alphonse des Vignolles has collected more than two hundred different calculations, "of which the shortest counts only 3,483 years from the creation of the world to Jesus Christ, and the longest counts 6,984 years. This is a difference of thirty-five centuries." Ricoli has drawn up a table of seventy of these systems. Father Tournemine, at the end of his edition of Menochius, gives the ninety-two most famous. The *Art of Verifying Dates* notes one hundred and eight. The modern Jews place the creation in 3761 before our era; Scaliger, in 3950; Petavius, in 3983; Usserius, in 4004; Clinton, in 4138; the new edition (1820) of the *Art of Verifying Dates*, in 4963; Hales, in 5411; Jackson, in 5426; the Church of Alexandria, in 5504; the

Church of Constantinople, in 5510; Vossius, in 6004; Panvinas, in 6311; the Alphonsine tables, in 6984. These very different figures result from the fact that chronologists follow diverse accounts of the sacred text and combine after their own fashion the chronological data of the Bible. Further on we shall discuss the bases of these systems, and we shall have to determine whether there is reason to increase, as many of our contemporaries believe, the age of man upon earth. Our discussion will not be hampered by any dogmatic decision. The Roman Church, which has chosen the Vulgate as the official edition of the Bible, has kept in the Martyrology, which forms a part of her Liturgy, the date of 5199, drawn from the Septuagint, for the creation of man. The Fathers and the Catholic exegetists have differed on this subject, and nobody disputes the right of geologists, paleontologists, and chronologists to search out scientifically the time that elapsed from the creation of man to Jesus Christ.

Certain supporters of prehistoric archæology have abused this liberty and assigned a very remote antiquity to mankind. Abbé Hamard, a great authority on this subject, is of the opinion that neither geology nor prehistoric archæology obliges us to fix the date of the creation of man many thousands of years earlier than is commonly thought. Yet we must acknowledge that, whilst rejecting the fantastic figures of some writers, Catholic scholars admit the appearance of man upon earth at a more remote date than that which results from the highest biblical chronology. M. de Lapparent, a great French authority, believes that the origin of man is interglacial and that it goes back, as far as it can be expressed in figures, to thirty or thirty-two thousand years. Others believe that man is of post-glacial origin, and the Marquis de Nadaillac has repeatedly attributed to the existence of man upon earth a duration from ten to twelve thousand years. Be this as it may, we shall have to examine further back whether, in default of geology and paleontology, history obliges us to raise the date of the origin of man and the age of mankind. We have also to determine in what biblical epoch the chronological increase can and ought to be made.

III. FROM ADAM TO THE DELUGE.—The time elapsed in this interval is calculated according to the genealogy of the descendants of Adam in the line of Seth (Gen. v. 1-31). This genealogy com-

prises ten patriarchs and nine generations; it notes the age of the patriarch at the time of his paternity, the number of years during which he lived after the birth of his son, and the total duration of his life. By adding the ten figures of the age of the patriarchs to the birth of their sons, we easily obtain the duration of the period. This simple calculation gives, however, notably divergent sums, because it is made from different dates. We possess, indeed, three accounts of the Pentateuch; the first is represented by the version of the Septuagint, the second by the massoretic Hebrew text and the Vulgate of St. Jerome, and the third by the Hebrew text of the Samaritans. The following table will enable us to judge at a glance the difference in the figures:—

NAME OF THE PATRIARCHS	AGE AT THE BIRTH OF THE SONS		
	Greek	Hebrew and Vulgate	Samaritan
Adam.....	230	130	130
Seth.....	205	105	105
Enos.....	190	90	90
Cainan.....	170	70	70
Malaleel.....	165	65	65
Jared.....	162	162	62
Enoch.....	165	65	65
Mathusalem.....	167	187	67
Lamech.....	188	182	53
Noah.....	500	500	500
From Noah to the Deluge.....	100	100	100
Total.....	2,242	1,656	1,307

We see here that the Hebrew and Samaritan are generally in accord, and present with the Septuagint a divergence of one hundred years for the epoch of paternity of the several patriarchs, except for Noah, about whom the three texts are in accord. But there are among them differences of detail. The Samaritan diminishes by 100 years the age of Jared at the birth of Enoch, by 120 years that of Mathusalem at the birth of Lamech, and by 129 years that of Lamech at the birth of Noah; it differs, therefore, from the Hebrew by 349 years and from the Septuagint by 935 years. On the other hand, the manuscripts of the Septuagint present differences. We have adopted the figures of the *Vaticanus*; the *Alexandrinus* has

twenty years more, and this total coincides with the calculations of Julius Africanus. Josephus arrived at a total of 2,156. We are reduced to conjecture to explain the origin of these divergences. They are too numerous to make us believe that they are due to the carelessness or ignorance of the copyists. Undoubtedly, nothing is altered in the transcription of manuscripts so easily as figures. But if we had to attribute the established divergences solely to this accidental cause, we could not account for the almost regular process of increase or subtraction of one hundred years. It is also necessary, it seems, to suspect, with St. Augustine (*De Civ. Dei*, xv. 13), a willful juggling with the figures, without our being able to say when, where, by whom, and how, it was done. Whom shall we hold responsible, the Jews of Palestine or the Alexandrine Jews? Was the process one of addition or subtraction? All these hypotheses are admissible. Certain critics have supposed that the Jews of Palestine reduced the age of the first men. "One might say that the Israelites desired, by abridging systematically the duration of the succession of the patriarchs, to cut short the numberless genealogies, which were nothing else but cosmogonies, like that of Berosus and of Sanchoniathon, and thus to combat polytheism, of which they were a constant source" (Ph. Berger). And F. Lenormant adds: "Perhaps it would be permissible to suppose that it was about the epoch of the Captivity that the Hebrews, just when they had knowledge of the fabulous periods begotten by the speculative imagination of the Chaldeans, began to feel scruples about the figures of their own books, and, wishing to guard against the possible danger of an analogous temptation, shortened their primitive chronology, in order to prevent its indefinite extension like that of the Gentiles." Paul Pezron thought that the Rabbi Akiba had dared to set hand on the divine Scriptures and had abridged the years in the Hebrew text. Other critics have made analogous suppositions. Lenormant, who admits the willful shortening of the Hebrew, also believes in a systematic lengthening of the Septuagint. The authors of the Alexandrine version revised the Hebrew text to put it in accord with the calculations of the Chaldeans, and increased by one hundred years the age of the patriarchs at the birth of their first son. St. Augustine (*loc. cit.*) recognized these intentional revisions; but instead of making the Septuagint responsible, he attributes them to a later scribe, who is supposed to have introduced them into his copy of the Greek

version of the Pentateuch. The Samaritan version might be no more exempt from willful alteration, and its chronology might be the result of an artificial combination. The shortening of the Hebrew text is clear, and its purpose is to square the dates thus obtained with the cycle of the sabbatic years. (Lenormant, *Les Origines*.)

We may admit that the figures of the three versions of the Pentateuch are not certain, and that its true reading may never be known. But we cannot admit with Lenormant that the figures of duration of life of the antediluvian patriarchs are "cyclic numbers." We maintain their historical character which they had in the original text and which they would still have if the text had come down to us in its entirety. Some critics have thought they found it in one of the three versions. Pezron followed the version of the Septuagint. Father Hummelhauer regards it as certainly faulty, because it makes Mathusalem survive the Deluge fourteen years. Its figures are less certain than those of the Hebrew text. The Samaritan version appears preferable even to that of the Massorets. They differ only for Jared, Mathusalem, and Lamech. Now, whilst the Hebrew dates the death of Mathusalem only from the year of the Deluge, the Samaritan makes Jared and Lamech die in the same year. According to the opinion of Father Hummelhauer, the Hebrews revised the figures in regard to these two patriarchs in order not to confound them with the impious generation swallowed up by the waters. But we are also permitted to suppose that the Samaritans arranged these figures in order to terminate the life of the three patriarchs in the last year of their chronological system. Mgr. Lamy favors the massoretic text, which represents the text received in Palestine and is proven to be not less ancient than the version of the Septuagint. One conclusion is forced upon every impartial reader, namely, that for this period the biblical chronology is altogether uncertain. Critics even discuss, as we shall see very soon, the chronological meaning of the patriarchal genealogies, which they suppose to be incomplete.

IV. FROM THE DELUGE TO ABRAHAM.—The duration of this period is measured by the genealogy of Sem, son of Noah (Gen. xi. 10-26), and is reckoned by the same proceeding as the length of the preceding period. Here, also, we possess three versions, which differ from one another and have not the same relation between them as

in the preceding. The following table sums up the data which serve for calculation:—

NAMES OF THE PATRIARCHS	AGE AT THE BIRTH OF THEIR SONS		
	GREEK	SAMARITAN	HEBREW
Sem (after the Deluge).....	2	2	2
Arphaxad	135	35	35
Cainan	130		
Sale.....	130	130	30
Heber.....	134	134	34
Phaleg.....	130	130	30
Reu.....	132	132	32
Sarug.....	130	130	30
Nachor.....	79	79	29
Thare.....	70	70	70
Abraham (until his vocation).....	75	75	75
TOTAL.....	1,147	917	367

Thus the three texts are in accord only for the years of Thare and Abraham. The Samaritan, which in the preceding period was generally in accord with the Hebrew, follows it now only once, namely, for the age of Arphaxad. It coincides with the Septuagint for six generations, of which five have each one hundred years more than the Hebrew, and one, that of Nachor, only fifty years. The Greek counts one generation more than the two others, that of Cainan; finally, its manuscripts present variations which have produced different results. Eusebius counts from the Deluge until Thare, 945; Theophilus of Antioch, 1070; Julius Africanus, 993; Clement of Alexandria, until the vocation of Abraham, 1250.

The figures of the genealogy of Sem are still more corrupted than those of the genealogy of Seth, and criticism is powerless to restore them to their primitive state. According to Father Hummelhauer, the Samaritan text is less sure and less authentic here than previously, because it presents only the total duration of the lives of the patriarchs of this line. The difference of one hundred years in the age of the ancestor at the birth of his son is the result of a subtraction or addition. The subtraction must have been wrought in the Hebrew text, it is said, in order that the postdiluvian patriarchs, whose lives are diminished, might not have begotten their sons

at a more advanced age than the antediluvian patriarchs. The reason is futile, for the genealogical list of Sem may omit the first generation of this patriarch, to speak only of that of the ancestors of Abraham. One may maintain, for a stronger reason, that the figures of the Hebrew have been diminished. Whilst this text gives to Nachor only 29 years at the birth of Thare, both the Samaritan and Greek attribute to him 79 years. Why this inferior number and not 129 years, if an addition of one hundred years had been made to the preceding figures? We can understand better the different reading in the hypothesis of a subtraction. If they have cut off a hundred years from the figures above one hundred, this operation has been found impossible on the figure of 79. The calculator removed only fifty years and obtained the number of 29 years. The authenticity of Cainan in the Septuagint has been disputed. The affirmative is supported on the presence of this personage in the genealogy of Jesus, drawn up by Luke (iii. 36). Although the textual criticism of the Gospels is favorable to the insertion of Cainan in this genealogy by the Evangelist himself, several Catholic exegetists presume that the name of Cainan was interpolated quite early into the text of St. Luke by a copyist who desired to make the Evangelist agree with the Septuagint. However it may be as to this particular point, we are forced once more to the conclusion that we are not certain of possessing the true figures written by Moses in Genesis and that we cannot draw from them a sure chronology.

Whilst the commentators have always believed that Moses had the intention of giving in the genealogies of Seth and of Sem a real chronology, which it is impossible to recover to-day, modern apolo-gists have maintained that the author of Genesis had not the intention of furnishing the elements of a general chronology. The ancient chronologists were persuaded that there were no breaks in the chain of the patriarchal generations, and that the genealogical lists were continuous. Now, the Bible presents examples of intentional omissions and missing links in the genealogies. In order to have three series of fourteen names in the genealogy of Jesus, St. Matthew (i. 8) omits three kings, Ochozias, Joas, and Amasias, between Joram and Ozias. The list of the high priests (I. Esdr. vii. 1) is certainly shortened, and to convince ourselves of this it is enough to compare it with I. Par. vi. 1. Esdras himself (I. Esdr. vii. 1-5) shortened his own genealogy, and between Azarias, whom he calls son of

Meraioth, and Meraioth himself, he omits five members, Johanan, Azarias, Achimas, Achitob, and Amarias, named in I. Par. vi. 7-14.

Now, in these fragmentary genealogies, the disjoined members are however reunited in the generative account, "he begot," or by the name of "son." The consequence of this is that in the Bible, as might be proved by other examples, the verb "to beget" and the name "son" mark the relation between a grandfather and a remote descendant as naturally as between a father and his son. The use of the verb "to beget" in the genealogy of Sem is therefore not necessarily a proof of the continuity of the generations, and it permits the insertion of omitted members there as well as in the genealogy of Jesus in St. Matthew. It has been objected, it is true, to this conclusion that the particular form of the patriarchal genealogies, in which the names are included in two or three series of numbers, excludes the idea of a lapse of continuity, and it appears contrary to the obvious and natural sense of the Mosaic account to translate Gen. xi. 10 by: "Sem, at the age of 100 years, begot *a son from whom is descended Arphaxad*," when in verses 12 and 13 his very name designates Arphaxad himself. To this objection Father Brucker answers judiciously that in this interpretation the same signification, perfectly determined, is attributed to the name of Arphaxad in the whole context. The metonymy is not in the names, which always remain the names of distinct individuals; it is in the verb *genuit*, "he begot," which we must understand in the sense *genuit mediate*, "he begot mediately." Therefore, the genealogies may be discontinued and pass generations, even when the mention of a patriarch is accompanied by figures of years. Against the hypothesis of breaks Mgr. Granclaude has appealed to all tradition. According to him, all the Fathers of the Church, in the quality of authorized interpreters of the Bible, and after them all the Catholic exegetists down to our days, have received the biblical genealogies as the absolute rule of chronological calculations and have never supposed the least omission therein. Hence, there is here a common sentiment, which cannot be abandoned without rashness, unless it is clearly indefensible.—This unanimous opinion of the Fathers does not exist, because they have differently interpreted the figures of Genesis, and their view does not constitute a traditional teaching against which we may not be permitted to go. Therefore, we can

without rashness maintain that the biblical genealogies are not continuous.

Moreover, this lack of sequence in the genealogy of Sem, in itself possible and probable, must necessarily be admitted if we wish to put sacred history, from the Deluge to Abraham, in accord with profane history. Compared with the antiquity of the ancient peoples, the chronology drawn from the Hebrew text is insufficient with its 367 years; the longer one of the Septuagint is certainly very restricted, if not too much so. We shall not insist on the great antiquity of the Chinese and Hindoos, for their traditions are certainly fabulous. Father Gaubil has commenced the dated history of the Chinese with the reign of the Emperor Yao, in the year 2357 before our era. Yet, in this epoch China had already been thickly inhabited and much advanced in civilization; but the time necessary for the establishment of the Celestial Empire is easily reconciled with the Septuagint. The connected history of the Hindoos goes back only to the fifteenth century before our era. Assyriologists generally admit that the first kings of Chaldea existed about thirty or even forty centuries before our era, that is, one thousand or even two thousand years before the epoch of Abraham. Although the chronological accounts furnished by Berosus may be in great part fabulous, the high antiquity of Chaldean history is revealed to us by monuments recently brought to light. Assurbanipal (668-628) relates that in his conquest of Susiana, in 633, he brought back to Erech a picture of the goddess Nana that Kudur-Nakhundi had carried off 1,635 years before, consequently 2,274 years before our era. A more ancient date is inscribed on a cylinder of Nabonidus, King of Babylon. While repairing the Temple of the Sun, at Sippara, this prince found, thirty-two feet under ground, the dedication composed by the first builder, Naram-Sin, son of Sargina, 3,200 years previously. Since Nabonidus reigned about 550 B. C., his calculation carries back the reign of Naram-Sin to about the year 3800 B. C. The Deluge, which was known to the Chaldeans and Babylonians, therefore goes back more than 4,000 years, for Naram-Sin had predecessors, posterior to this cataclysm. (Cf. Lenormant, *Histoire Ancienne de l'Orient*.) The postdiluvian chronology of the Septuagint, which is the highest, is therefore insufficient. The same conclusion is deduced from the history of Egypt. Manetho, a Sebennytan priest of the third century before our era, attributed to Egypt an

antiquity of 30,000 years before Alexander the Great. Passing by the mythic reigns, there still remain thirty historical dynasties, which begin with Menes and which fill a space of about 5,000 years. Now, the history of Manetho, beginning with the eighteenth dynasty, has been confirmed by the royal lists reproduced in the papyrus of Turin and the tables of Abydos, of Saqqarah, and of Karnak. Nevertheless, Egyptologists still disagree on the subject of the total duration of the Egyptian history, because they adopt different starting points, and dispute about the continuity or the simultaneousness of the dynasties. If all have been successive, their history goes back 5,000 years; if many have been contemporaneous or collateral, their history may be reduced to the limits of the chronology of the Septuagint. But it appears that if some have reigned simultaneously, the most of them have succeeded one another, and the duration of their existence exceeds that of the fifteen generations which the Bible places between the Deluge and Moses. Besides, were it absolutely impossible to determine in a precise manner the beginning of historical times in the valley of the Nile, it remains proven that the beginnings of this country are very ancient. From the period that it becomes known to us, Egypt appears with a very advanced civilization, an openly polytheistic religion, and pretensions to an already lengthy existence. Considering it only as it was in the time of Moses, "can we (without supposing omissions in the genealogies of chapter xi. of Genesis) comprise within the space of fifteen generations the multiplication of mankind after the Deluge; the dispersion of the peoples; the forgetfulness of revealed or natural religion; the rise of polytheism and of idolatry; the colonization of Egypt; the formation of a civilization different from the Asiatic, with its language, its writing, and peculiar religion; the differentiation of the races, white, black, colored; the succession, generally *from father to son*, of more than one hundred kings known by their monuments to have governed the whole of Egypt, without taking into account a much larger number that reigned over that country, but of whom we have not yet discovered any monuments or inscriptions?" (E. Pannier, *La Chronologie des Temps Primitifs*.)

If profane history obliges us to lengthen the biblical history, it is in the period which extends from the Deluge to Abraham that the increase should take place. To what extent this is necessary we cannot exactly tell. Some Egyptologists find themselves only

"somewhat inconvenienced" to make the history of Egypt coincide with the chronology of the Septuagint. Others require an increase of thousands of years. The exegetists cannot say between what links of the genealogy of Sem they should insert those that are missing. It cannot be between Noah and Sem, nor between Thare and Abraham, whose direct relations of paternity and filiation are expressly marked in Scripture; it may be between other links of the genealogical chain, whose bonds are less close.

V. FROM THE CALL OF ABRAHAM TO THE DEPARTURE FROM EGYPT.—The Bible expressly marks the principal dates of this period. Abraham was 75 years old when he left Haran to go into the country of Chanaan (Gen. xii. 4). He was 100 years old when the birth of Isaac was announced to him (xvii. 1, 17; xxi. 5). At the age of 40, Isaac married Rebecca, and 20 years afterwards Esau and Jacob were born (xxv. 20, 26). Hence, 85 years had elapsed between the arrival of Abraham in Palestine and the birth of his grandsons. Jacob was 130 years old when he went to Egypt (xlvii. 9). His sons dwelt in this country 430 years (Ex. xii. 40). All these figures added give to this period a total of 645 years.

The date of the sojourn of the Israelites in Egypt is alone contested. The version of the Septuagint and the Samaritan Pentateuch present (Ex. xii. 40) a notable difference, which is confirmed by the Targums of the pseudo-Jonathan and of Jerusalem: "The time which the children of Israel and *their fathers* dwelt in Egypt and *in the country of Chanaan* was 430 years." This figure has, therefore, for its starting point the arrival of Abraham in Palestine. Now, as from this epoch until the coming of Jacob into Egypt 215 years elapsed, the sojourn of the Hebrews in the land of Gessen had also a duration of 215 years. Josephus reproduces this calculation, and, according to Calmet, the most of the commentators adopt this view and follow the reading of the Septuagint. But this reading was not found in all the ancient manuscripts of the Greek version, for St. Theophilus (*Ad Autolyicum*) wrote that the Israelites sojourned 430 years in Egypt. St. Chrysostom, who proposes the period of 215 years (*In Genesim*, Hom. xxxvii.), admits, however, elsewhere (*In Act. Apost. Hom.* xvi.), that the Hebrews remained in the country of the Pharaohs 400 years and more. The Talmud of Jerusalem, treatise on *Meghilla*, points out verse 40 of chapter xii. of Exodus as one of the thirteen passages which the Septuagint

have modified in their translation of the Pentateuch on account of King Ptolemy. Besides, the words, "and their fathers," . . . "and in the land of Chanaan," are hardly in agreement with the context, which speaks only of Egypt, and appear to be glosses added to the original text.

The adherents of the shortest date confirm their opinion by the testimony of St. Paul (Gal. iii. 17) and by the less extended genealogy of Moses. The Apostle, indeed, speaks incidentally of the date of the promulgation of the Law, made 430 years after the promise. But he does not fix precisely the starting point of these 430 years, and instead of putting it at the first promise of God to Abraham, on his entry into the land of Chanaan, we might refer it to the later promises repeated to Abraham, Isaac, and Jacob. As to the genealogy of Moses, we may properly consider it as one of those abridged genealogies of which we have spoken.

The Hebrew text, which gives a duration of 430 years, does not stand alone. It is reproduced in the Targum of Onkelos, the Peshito, the Latin Vulgate, the Arabic version of Saadiah, and the Greek version of Venice. It is confirmed by other biblical accounts. The time of the captivity of the Hebrews had been foretold by God to Abraham: *Know thou beforehand that thy seed shall be a stranger in a land not their own, and they shall bring them under bondage, and afflict them four hundred years* (Gen. xv. 13). This prophecy, recalled by St. Stephen (Act. vii. 6-7), is also found in the version of the Septuagint, as well as in the Hebrew text, and announces in round numbers the length of the sojourn of the Israelites in Egypt. God adds, verse 16, that the posterity of Abraham shall return into Palestine in the fourth generation (Hebrew: *dôr*). The word *dôr* signifies "period of the human life," and may be understood of one century. Interpreters refer also to this prophecy the words of St. Paul in his discourse in the synagogue of Antioch of Pisidia (Act. xiii. 19-20). They adopt the reading of the Vulgate, which from the critical point of view is the best, and they understand the number of *about* 450 years in the 400 years of Genesis xv. 13, plus the 40 years of sojourn in the desert and the 7 of the conquest of Palestine by Josue. Achior, general of the Ammonites, reported later on to Holophernes that the Israelites had multiplied in Egypt during four hundred years to such an extent that they formed a numberless army (Judith v. 9). According to some interpreters, Ezechiel (iv. 5-6)

foretold a second bondage of Egypt, whose duration is estimated at 390, plus 40 days, that is, 430 years, for the days designate years.

To these exegetical proofs we may add in favor of the figure 430 an argument drawn from the history of Egypt. It is very probable that Joseph was led away into Egypt under the Shepherd Kings, and it is generally believed that it was under the Pharaoh Apapi II., whom Manetho calls Apophis. Now, between the reign of this king and that of Menephtah, under whom the exodus took place, "we must place the 150 years at least which, according to the Egyptologists, were necessary for the indigenous chiefs to destroy the domination of the Shepherds; then the whole duration of the eighteenth dynasty and of a portion of the nineteenth, that is, more than sixteen reigns, of which two (those of Thotmes III. and of Rameses II.) embraced alone 121 years." (J. Brucker, in *The Controversy* of September 15, 1886.) The duration of the sojourn of the Hebrews in Egypt has been, therefore, really 430 years. Consequently, if, as Oppert believes, the exodus took place in 1493 B. C., the entering of the Israelites into Egypt goes back to 1923, Jacob was born in 2053, and Abraham arrived in Palestine in 2138. But these figures are far from being certain.

VI. FROM THE EXODUS TO THE BUILDING OF THE TEMPLE OF SALOMON.—All the Egyptologists, guided by the synchronism of the epochs and by the whole of the facts, are agreed in placing the departure of the Hebrews under the nineteenth dynasty, but they are divided as to the name of the king under whom this great event took place. Some, like Maspero, say it was Seti II.; Lepsius, Rougé, and Chabas, followed by almost all the learned investigators of France, England, and Germany, by Lenormant, Sayce, Brugsch, Ebers, etc., think it was Menephtah I. This divergence of opinions does not notably affect the date of exodus. In fact, we cannot fix it exactly according to the chronology of the kings of Egypt, which is yet too uncertain. We have to determine it according to the Bible and the history of the kings of Juda and Israel. Oppert refers it to the month of April, 1493 B. C. The other chronologists deviate from him only by a few years.

The interval that separates the exodus from the building of the temple of Solomon is measured in precise figures (III. Ki. vi. 1); it was 480 years according to the Hebrew text and 440 according

to the Septuagint. This date has been much discussed. Critics have contested its authenticity; they have tried to make this a cyclic figure, because 480 is twelve times forty. Some chronologists found it too low and wished to raise it; others regard it too high and wish to lower it. The former support their contention on the chronology of the Book of Judges. The duration of each judicature is indicated by the sacred writer, and the total sum of the biblical figures is 410 years. If we add the judicature of Heli, which was 40 years (I. Ki. iv. 18), and the interval from Heli to the fourth year of Solomon, an interval of 84 years, we obtain the sum of 534. With the 65 years elapsed from the going out of Egypt until the death of Josue, by omitting the two unknown figures of the judicature of Samuel before the coming of Saul and from the time that separates Othniel from Josue, we reach, at the lowest figure, a total of 599 years. It coincides close enough with the calculation of 592 years which Josephus counts from the going out of Egypt until the building of the temple. The commentators of the Acts, who in this book (xiii. 20) adopt the reading of the "text received," grant to the period of the Judges a duration of 450 years and reject the date of III. Ki. vi. 1. In order to reconcile these apparently contradictory accounts, Danko has gratuitously supposed that the author of the Book of Kings, writing in the theocratic sense, passed over in silence the years during which the Israelites had given themselves up to idolatry and had been reduced into bondage. The only valid reconciliation is to admit that several judges were contemporaneous. A careful study of the text, moreover, suggests this solution, although we can only conjecture which judges have lived simultaneously. Some Egyptologists have pushed still further the hypothesis of the simultaneousness of the judicatures, and with the design of establishing a perfect synchronism between sacred history and the history of Egypt, they have reduced from 300 to 350 years the period of the desert, of Josue, the Judges, and David. But Egyptian chronology beyond the twenty-second dynasty is not certain enough to weaken the account of the Book of Kings, which we uphold until there is proof to the contrary. If, therefore, the exodus took place in 1493, Solomon would have commenced the building of the Temple of the Lord in 1013 B. C.; but the synchronisms of ancient history seem to establish that it was only some years later that Solomon undertook this great work.

VII. FROM THE BUILDING OF THE TEMPLE OF SALOMON UNTIL ITS DESTRUCTION BY THE CHALDEANS.—The dates of this period have been carefully noted in the last books of Kings. The author, who had consulted sources lost to-day, gives two royal lists, that of the kings of Israel and that of the kings of Juda. Their reconciliation is extremely difficult, and the difficulties arising are not yet solved. St. Jerome, who had noticed them, wrote to the priest Vitalis (*Epist.* lii. 5) that to stop at these questions was rather the affair of an idle man than that of a busy student. On the throne of Juda, Roboam reigned 17 years (III. Ki. xiv. 21; II. Par. xii. 13); Abia 3 (III. Ki. xv. 2; II. Par. xiii. 2); Asa 41 (III. Ki. xv. 10; II. Par. xvi. 13); Josaphat 25 (III. Ki. xxii. 42; II. Par. xx. 31); Joram 8 (IV. Ki. viii. 17; II. Par. xxi. 20); Ochosias 1 (IV. Ki. viii. 26; II. Par. xxii. 2); Athalia 6 (IV. Ki. xi. 3; II. Par. xxii. 12); Joas 40 (IV. Ki. xii. 1; II. Par. xxiv. 1); Amasias 29 (IV. Ki. xiv. 2; II. Par. xxv. 1); Ozias 52 (IV. Ki. xv. 2; II. Par. xxvi. 3); Joatham 16 (IV. Ki. xv. 33; II. Par. xxvii. 1); Achaz 16 (IV. Ki. xvi. 2; II. Par. xxviii. 1); Ezechias 29 (IV. Ki. xviii. 2; II. Par. xxix. 1); Manasse 55 (IV. Ki. xxi. 1; II. Par. xxxiii. 1); Amon 2 (IV. Ki. xxi. 19; II. Par. xxxiii. 21); Josias 31 (IV. Ki. xxii. 1; II. Par. xxxiv. 1); Joachaz 3 months (IV. Ki. xxiii. 31; II. Par. xxxvi. 2); Joakim 11 years (IV. Ki. xxiii. 36; II. Par. xxxvi. 5); Jechonias, or Joachim, 3 months and 10 days (IV. Ki. xxiv. 8; II. Par. xxxvi. 9); Sedecias 11 years (IV. Ki. xxiv. 18; II. Par. xxxvi. 11). In the kingdom of Israel, Jeroboam I. reigned 22 years (III. Ki. xiv. 20); Nadab 2 (*ibid.* xv. 25); Baasa 24 (xv. 33); Ela 2 (xvi. 8); Zambri 7 days (xvi. 15); Amri 12 years (xvi. 23); Achab 22 (xvi. 29); Ochozias 2 (xxii. 52); Joram 12 (IV. Ki. iii. 1); Jehu 28 (*ibid.* x. 36); Joachaz 17 (xiii. 1); Joas 16 (xiii. 10); Jeroboam II. 41 (xiv. 23); Zacharias 6 months (xv. 8); Phaceia 2 (xv. 23); Phacee 20 (xv. 27); Osee 9 (xvii. 1). Several of these figures do not agree with other chronological data of the books of Kings and of Paralipomena, but it does not enter into our design to discuss them here.

A more general difficulty springs from the difference which the totals of these lists present in the period of their coincidence. In fact, if we add the figures from the first years of Roboam, when the separation of the two kingdoms commences, until the sixth year of Ezechias, during which Samaria was taken (IV. Ki. xviii. 10), we find for the kings of Juda a sum of 261 years, and for those of

Israel only 240 years. Hence there is a disagreement between the two lists of about twenty years. Numerous theories of reconciliation have been supposed. Recent critics have diversely lengthened the reigns of Jeroboam II. and of Phacee; others have admitted associations to the throne of Juda. More generally it is believed that the succession was regular and constant on the throne of David, and critics have introduced into Israel two inter-reigns or periods of anarchy. The first, which lasted eleven years, is placed between the reign of Jeroboam II. and that of his son Zacharias, who commenced to reign only in the thirty-eighth year of Azarias or Ozias of Juda (IV. Ki. xv. 8). The second, of nine years, would have existed between Phacee and Osee. But the sacred text seems to state that these princes succeeded one another immediately, and it is hardly probable that the throne of Israel remained unoccupied at two different times during several years. These inter-reigns, which have no direct foundation in the Bible, are therefore hypotheses, invented by embarrassed chronologists, and they may be an indication that the ordinary chronology of the Jewish kings is too long.

They have discovered at Ninive an Assyrian chronological canon, which agrees with the biblical figures only on condition of reducing about forty years the total of the reigns of the kings of Juda. It is a list of personages called *limmu* or eponyms, who gave their names to the year like the archons at Athens and the consuls at Rome. It commences in the reign of Binnirar II., in 893 B. C., and extends at least to 647. It therefore permits us to check the corresponding biblical data. If the two chronologies are in perfect harmony for the taking of Samaria by the Assyrians in 721, there is manifest disagreement between them on several points. The critics until now have been unable to agree on the reconciliation of the divergent figures. Some defend the biblical chronology, others abandon it. As it is artificial, and as the disagreement of the figures of the existing text of the Bible is certainly the result of the faults of copyists in the transcription of the numbers, we may hold, "at least provisionally, that the persons whose names are found mentioned together in the cuneiform inscriptions and which correspond with the biblical names have been contemporaries, whatever embarrassment may be experienced in reconciling the dates furnished by the Bible, on the one hand, and by the Assyrian monuments, on the other."

(F. Vigouroux, *La Bible et les Decouvertes Modernes*.) Let us examine the points of contact that create difficulty.

According to the biblical chronology generally received, Achab, King of Israel, died in the year 897 B. C. Now the Assyrian inscriptions assert that he was defeated with the confederate kings at Karkar by the King of Ninive, Salmanasar II., in 854, that is, more than forty years after the date usually assigned to his death. The declaration of the cuneiform texts is clear and precise, whilst the calculations of the biblical chronologists may be erroneous. Therefore, we have to admit, it seems, that Achab and Salmanasar II. were contemporaries.

Ozias, King of Juda, reigned, it is said, from 809 to 758. Now, the inscriptions of Theglathphalasar II. show him at war with this king in the year 742 or 740, sixteen or eighteen years after his death. Manahem, King of Israel, occupied the throne from 770 to 759, and twenty-one years after the end of his reign, in 738, the same Theglathphalasar counts him among his tributaries. To uphold the biblical chronology Oppert believes that the Azriyahu of the inscriptions is not Azarias or Ozias, father of Joatham and grandfather of Achaz, but a usurper, the son of Tabeel, of which Isaias speaks (vii. 6). As to Manahem, who paid tribute to Phul, he is distinct from Manahem II., tributary of Theglathphalasar. This explanation is inadmissible, and we have to acknowledge that Azarias, King of Juda, Manahem, King of Israel, and Theglathphalasar, King of Ninive, whom it seems we have to identify with Phul (IV. Ki. xv. 19-20; I. Par. v. 26), are contemporaneous.

The biblical and cuneiform documents are found in disagreement on another point. The Fourth Book of Kings (xviii. 13) tells us that Sennacherib marched against the cities of Juda in the fourteenth year of the reign of Ezechias, that is, in 713, because the Jewish king had mounted the throne in 727. Now, according to the canon of the eponyms, Sennacherib became king in 705, and his expedition against Palestine took place in 701. The sickness of Ezechias and the embassy of Merodach-Baladan, King of Babylon, would have taken place only after the disaster of Sennacherib (IV. Ki. xx. 1, 12). Now, Merodach-Baladan would have reigned from 722 to 710. The best answer to this difficulty is to acknowledge that the biblical account has disarranged the order of events. The sickness of Ezechias really took place in the fourteenth year of his reign, because the

king lived fifteen years after his recovery, and his reign lasted twenty-nine years. The embassy of Merodach-Baladan is posterior to him and may be placed in 703 or 702, when this king, a native of Lower Chaldea, after having been driven away from Babylon, had again taken possession of the throne of this city. The invasion of Sennacherib took place in 701. If the Book of Kings put these three facts in an inverted order, it is probably because its author adopted the unchronological arrangement of the prophet Isaias (xxxvi.—xxxix.). The date (IV. Ki. xviii. 13) ought to be changed and put at the head of the account of the sickness of Ezechias.

It was the empire of Babylon that overthrew the throne of Juda. Before entering on his reign, Nabuchodonosor made a campaign against Nechao, King of Egypt; Joakim, King of Juda, acknowledged himself as his tributary. But he revolted and refused to pay the tribute. When Nabuchodonosor arrived in Judea, Joakim was dead and replaced by his son Jechonias. At the end of a three months' reign the latter was led away into captivity at Babylon. His uncle Sedecias was placed on the throne; he also revolted. Nabuzardan besieged Jerusalem, which, constrained by famine, capitulated in 599, after a long resistance. This date ends the period which we are studying.

Thus it is seen that the chronology of the kings of Israel and of Juda is not so clear and certain as is commonly believed. It needs to be brought into agreement with the Assyrian chronology. Father Brunengo has made the attempt to do this, and he has set the beginning of the schism of the ten tribes in the year 930 B. C., instead of 976 B. C., the date ordinarily assigned to it. Adopting this view, we will reproduce here the chronological list of the Jewish kings, adopted by Lenormant and Babelon: Saul, 1050–1012; David, 1012–973; Salomon, 973–932. In the kingdom of Israel: Jeroboam I., 932–911; Nadab, 911–909; Baasa, 909–886; Ela, 886–885; Zambri, 885; Amri, 885–873; Achab, 873–843; Ochozias, 843–842; Joram, 842–830; Jehu, 830–802; Joachaz, 802–785; Joas, 785–769; Jeroboam II., 769–744; Zacharias, 744; Sellum, 744; Manahem, Phaceia, and Phacee, overthrown and restored one after another, 744–732; Osee, 732–724. Fall of the kingdom of Israel, in 721. In the kingdom of Juda: Roboam, 932–915; Abia, 915–912; Asa, 912–870; Josaphat, 870–836; Joram, 836–831; Ochozias, 831–830; Athalia, 830–823; Joas, 823–783; Amasias, 783–764; Ozias, or Azarias, 764–739;

Joatham, 739-735; Achaz, 735-729; Ezechias, 729-688; Manasse, 688-645; Amon, 645-643; Josias, 643-612; Joacaz, 612; Joakim, 612-600; Jechonias, or Joachim, 600-599; Sedecias, 599.

VIII. FROM THE BABYLONIAN CAPTIVITY UNTIL THE BIRTH OF JESUS CHRIST.—For this period a first date is furnished by Jeremias (xxv. 11); but the commentators are not in agreement as to the starting point of the duration of the seventy years' captivity. Some date it from the first deportation, which took place in the fourth year of Joakim, in 606 (or 608), according to the ordinary calculations, and find seventy years until the edict which Cyrus published in 536 (or 538), giving to the Jews the right to rebuild the Temple of Jerusalem (I. Esdr. i. 1). Others take as first date the destruction of Jerusalem (II. Par. xxxvi. 21-3), in 599, and as last the resumption of the building of the Temple, which took place in the second year of Darius, son of Hystaspes (Aggeus i. 1-14; I. Esdr. v. 1), in 519.

Be it as it may in regard to the commencement of the captivity of Babylon, as foretold by Jeremias, in the first year of Cyrus at Babylon, in 536, many captives returned into Judea, under the leadership of Zorobabel and of the high priest Josue, and as soon as they had arrived they made the necessary preparations to rebuild the Temple of Jerusalem. But, on account of numerous obstacles, the building could be completed only the sixth year of Darius, that is, in 516 (I. Esdr. vi. 15). In the seventh year of Artaxerxes, Esdras brought other captives back into Judea (I. Esdr. vii. 7). In the twentieth year of Artaxerxes, Nehemias, cup-bearer of this prince, obtained the permission to rebuild the walls and gates of Jerusalem (II. Esdr. ii. 1-8). The identity of this king is disputed. The most of the exegetists admit that Esdras and Nehemias were able to gain, thirteen years apart, the favors of the same king, whom they identify with Artaxerxes I., called Longo-Manus, who reigned from 464 to 424. Therefore, Esdras could have brought back his caravan in 457, and Nehemias could have restored the walls of Jerusalem in 444, and he would have remained in Palestine until 433, the thirty-second year of the reign (II. Esdr. v. 14). Saulcy and Kaulen hold that it was Artaxerxes II., surnamed Mnemon. Van Hoonacker distinguishes the two kings. He believes that Nehemias returned to Judea the twentieth year of Artaxerxes I., but that Esdras, instead of having effected his return thirteen years previously, revived the

Jewish religion only fifty-nine years afterwards, under Artaxerxes Mnemon (404-358).

From Nehemias, whose end is unknown, until the Machabees, there elapsed a period of 260 years about which we know very little and whose chronology the Bible has not fixed. But the two books of the Machabees date the events which they relate after the era of the Seleucides. This era starts with the autumn of 312 B. C. It is easy, then, to determine the dates of the books of the Machabees. Mathathias rose against Antiochus Epiphanes in the year 145 of the Seleucides, consequently in the year 167 B. C.; he died in the year following (I. Mach. ii. 70). His son Judas was at the head of the revolt until his death, in 161 (I. Mach. ix. 3, 18). Jonathas, brother of Judas, continued the struggle until 143. In the year 142, the first year of Simon, the Jewish nation became again independent (I. Mach. xiii. 41-42). Simon, who died in 135, had for successor his son, John Hyrcanus (I. Mach. xvi.). For the remainder of the Jewish history the Bible notes no other date except the death of Herod the Great. In the interval, the princes or kings who governed Judea were John Hyrcanus I., 135-107; Aristobolus I., 107-106; Alexander Janneus, 106-79; Hyrcanus II., 79-66; Aristobolus II., 66-63; Hyrcanus II. restored, 63-40; Herod I., 40-4 B. C.

IX. DURATION OF THE LIFE OF JESUS.—The beginning of the Christian era was fixed, in the sixth century, by a monk, Dionysius the Small, as occurring in the year 754 of the foundation of Rome. According to him, our Lord was born on December the 25th of the year of Rome 753. But he was deceived in his calculations, and made the Christian era begin too late. The date of the birth of our Lord is controverted. What is certain is that Jesus Christ was born under Herod (Matt. ii. 1), at the time when a census was taken, as ordered by Augustus (Luke ii. 1-5). The determination of these two facts of the evangelical account marks the precise epoch of the birth of Jesus. According to Josephus, Herod reigned thirty-seven years, if we count the years of his reign from the acknowledgment of his royalty by the Roman senate, and thirty-four, if we calculate his effective reign beginning with his entry into Jerusalem. Now the senate declared Herod King of Palestine under the consulate of Domitius Calvinus and of Asinius Pollion, in the year of Rome 714, or 40 B. C. Herod took Jerusalem under the consulate of Vipsanius Agrippa and of Caninius Gallus, in the year of Rome 717, or

37 B. C. The last year of the reign of Herod was, therefore, in the year of Rome 750, or four years before our era. According to the duration of the reigns of his sons and successors, we can conclude that Herod died before the 7th Nisan or the 2d of April of this year. If Jesus were born on December the 25th, it could not have been later than on December the 25th, 749.

Other dates will tell us whether the birth of Jesus goes back a few years earlier. St. Luke (ii. 1) says that it took place when the first census of the Roman world was made, Quirinius (Vulgate: Cyrinus) being governor of Syria. Now, according to Josephus, Quirinius was sent into Syria, with the mission of taking the census of Judea, the thirty-seventh year after the battle of Actium, that is, about ten years after the death of Herod, when Archelaus was deposed from the throne and Judea reunited with the empire. To reconcile these apparently contradictory accounts, all kinds of hypotheses have been imagined. Some have translated the text thus: "This census took place before the one that was made when Quirinius governed Judea." But Th. Mommsen has proved that an inscription found at Tivoli in 1764 could refer only to Publius Sulpicius Quirinius. Now it affirms that he was twice legate of Syria. Hence it is no longer necessary to have recourse to an apparently forced interpretation. However, the difficulty remains, for the first legation of Quirinius into Syria can have taken place only in the year of Rome 751, or, at the earliest, about the end of 750, consequently after the death of Herod. To solve this difficulty, it has been thought that the census of which St. Luke speaks had been commenced before the year of Rome 750, by the governor at that time, who might have been Sentius Saturninus, mentioned by Tertullian (*Contra Marcion*, iv. 19); but, interrupted by the death of Herod, it could be completed only about 751, when Quirinius took possession of his province. Thus understood, the text of St. Luke would confirm the opinion which places the birth of the Saviour before the year of Rome 750. In fact, the edict of the general census of the empire must have been posterior to the universal pacification, marked by the closing of the temple of Janus, at Rome. This fact took place only in the middle of summer of the year 746, eight years before the present era. Hence the birth of Christ ought to be fixed on December the 25th of one of the three years 747, 748, or 749.

Most of the chronologists select one of these three years and justify their preference by the relation which they establish between the birth of the Saviour and the other chronological accounts of the Gospel. Now, St. Luke further informs us (iii. 1, 23) that St. John the Baptist commenced his mission in the fifteenth year of Tiberius, and that Jesus was about 30 years old when He received baptism from the hands of His precursor. But the years of Tiberius have been computed in two different ways. If we adopt the ordinary fashion of counting, the reign of Tiberius begins with the death of Augustus, which took place on August 19th, in the year of Rome 767. The fifteenth year of Tiberius runs, therefore, from August 19th, 781, to August 19th, 782, or 28-29 of our era. By cutting off exactly thirty years the birth of Jesus would fall in 751; but this date would not agree with the death of Herod, which took place in 750. Therefore, we must understand the words "about thirty years" in a broader sense, and, according to the opinion of Keppler, they may be said of a man who is more than twenty-five years old and less than thirty-five years. If we suppose Jesus born in 747, He would have had from thirty-four to thirty-five years in the fifteenth year of Tiberius; if He was born only in 749, then He would have had from thirty-two to thirty-three years. Several chronologists have counted the fifteenth year of Tiberius not from the death of Augustus, but from the association of Tiberius to the tribunitial power, in the year of Rome 765 or 764. Thus it would fall in 779 or 778. Consequently, Jesus, was he born about 747, would have been at the time of His baptism only about thirty-one years old.

As to the duration of the public life of Jesus, it has been reduced to one year by some ancient writers for reasons having little foundation, and which St. Irenæus has ably refuted. Eusebius extended it to three years and a half. Some modern commentators adopt this figure, but by referring to the Paschs expressly mentioned by St. John, and understanding by this solemnity "the festival of the Jews," of which there is question in John v. 1. However, many give to the preaching of the Saviour only a duration of two years and a half, and, with St. Irenæus and St. Jerome (*In Isaiam* I. ix.), they acknowledge only three Paschs. The first soon followed the baptism (John ii. 13); the second was shortly preceded by the multiplication of the loaves of bread (vi. 4); the third was that of the Passion (xiii. 1). If, therefore, our Lord were baptized in the fif-

teenth year of Tiberius, the first Pasch of His ministry took place in the year of Rome 782, the twenty-ninth of the present era, and the last, that of the Passion, in the year A. D. 31 or 32, of Rome, 784 or 785.

Thus the date of the death of Jesus would almost be fixed to a year, and we could verify it by determining in which year the day of Jesus' death was found to be a Friday (Mark xv. 42; Luke xxiii. 54; John xix. 31). Unfortunately, this very simple question is rendered very complicated, because there is question whether this Friday was the 14th or 15th Nisan. Now, on this point the chronologists and commentators are divided into two camps. If the Friday of the death of the Saviour was the 14th Nisan, we have to eliminate the year 32, during which the 14th Nisan commenced on Saturday evening, and to accept the year 33, during which this day fell, according to the manner the Jews counted, from Thursday evening to Friday evening. If we prefer the 15th Nisan, in order to restrict the inquiry to the years 28 to 34, this day of the first month happened to be a Friday only in the years 30, 31, and 34 of the popular era. We can see, then, by this short summary, that the dates and the duration of the life of Jesus Christ are uncertain. However, the labors of the learned have notably reduced the limits of uncertainty. The result seems to be that we must fix the time of the birth of the Saviour between the years of Rome 747 and 749, or 7 and 5 before the Christian era, and those of His death between the years 29 and 33 of our era. The duration of the life of Jesus will range between a minimum of thirty-three and a maximum of thirty-eight years.

X. CHRONOLOGY OF THE HISTORY OF THE APOSTLES.—To fix this we have only some dates of the Acts of the Apostles and of the Epistles of St. Paul. The apostolic history commences with the ascension of Jesus, which took place forty days after His resurrection. Ten days later the Holy Ghost descended upon the Apostles (Acts ii. 1). These facts occurred within the same year of the death of the Saviour; their date varies, therefore, according to that adopted for the latter event. The death of Herod Agrippa I., related in Acts xii. 19-23, determines the time of the martyrdom of St. James and of the imprisonment of St. Peter. According to Josephus, this king was then celebrating games in honor of the Emperor Claudius. This was in the year 44 of our era. It is not necessary, however,

to say that the persecution of Herod Agrippa against the Christians took place in the same year as his death, and we may suppose with Patrizi and Fouard that there elapsed several years in the interval. These critics also place the death of St. James and the imprisonment of St. Peter in the year 42.

The first mission of Saul and Barnabas is posterior to the death of Herod Agrippa. Hence we have to fix it at the earliest about the end of the year 44. This date may serve as starting point in the life of St. Paul. The Apostle of the Gentiles, before his voyage to Jerusalem, had passed one year at Antioch (Acts xi. 26). If we keep account of his return to Tarsus and his three years in Arabia and Damascus (Acts ix. 30; Gal. i. 17, 21), we have to refer his conversion to five or six years previously. Other considerations confirm these conclusions, which are only approximate. Aretas, King of Arabia, reigned at Damascus when St. Paul had to leave this city (II. Cor. xi. 32). Now, it is generally believed that this king retook this city after the death of Tiberius, which occurred March 16th, in the year 37. On the other hand, the persecution by the Jews of the Christians, in which Saul took part (Acts viii. 57), could have taken place only after the departure of Pilate.

Another certain date is furnished to us by the relations of St. Paul with the procurator Felix. The Apostle was captive at Cæsarea for two years, when Felix was replaced by Portius Festus (Acts xxiv. 27). Now Felix was recalled to Rome by Nero in the year 60 or 61. Before Festus, St. Paul appealed to Cæsar; he traveled the whole winter and arrived in Rome in the spring of the year 61 or 62. He remained a prisoner for two years (Acts xxviii. 30). Hence it was in 63 or 64 when the last events related in the Acts took place, and when perhaps this history was composed. Such is the extreme date of the inspired history of the Apostles. But the date of the departure of Felix assists us in determining the chronological place of the anterior facts. If St. Paul left Cæsarea in 61, his captivity in this city had commenced in 59. He had left Ephesus one year before (Acts xx. 1; I. Cor. xvi. 8), and his sojourn in that city had lasted nearly three years (Acts xix. 8, 10; xx. 31). After his second mission, which had been of one year at least, the Apostle had stayed one year and six months at Corinth (Acts xviii. 11). Therefore, six years had elapsed before the Council of Jerusalem (Acts xv. 4-6), which thus took place in the year 52. If we count

the fourteen years that preceded the presence of St. Paul at this Council (Gal. ii. 1), and the three years that separated his conversion from his first voyage to Jerusalem (Gal. i. 18), we would end in dating the conversion to the year 34. Whilst maintaining the interval of seventeen years between the Council of Jerusalem and the conversion of St. Paul, we can, however, place this latter in 37, when we remember "that the Jews are in the habit of counting the unfinished and incomplete year as if it were a full one." (Fouard, *St. Pierre*, p. 527.) By counting thus, the first voyage of St. Paul to Jerusalem would have taken place in 39 and the second in 52. The dates of the composition of the Epistles and of the Apocalypse are of the domain of Biblical Introduction and do not belong to sacred chronology, strictly speaking.

XI. CHRONOLOGICAL TABLE OF THE PRINCIPAL BIBLICAL EVENTS.
—This table will give a summary of the present chapter and will present the principal dates of the Bible. All those that precede the taking of Samaria are more or less uncertain. We will indicate them, beginning with the call of Abraham, according to the chronology usually received, although it is doubtful, to the establishment of the monarchy, and even in this epoch, there is reason to believe that it commences too early the reigns of the kings of Juda and of Israel, before the taking of Samaria, whose date is assured and incontestable :—

Creation of the world and of man.....	Dates unknown
Deluge	Date unknown
	B. C.
Arrival of Abraham in Palestine.....	2138
Birth of Isaac	2113
Birth of Esau and Jacob.....	2053
Descent of Jacob into Egypt.....	1923
Exodus and the promulgation of the Decalogue.....	1493
Death of Aaron and of Moses. End of the sojourn in the desert	1453
Conquest of the Promised Land by Josue.....	1453-1446
Death of Josue.	1428
Bondage under Chusan Rasathaim.....	1409-1401
Othoniel and the peace which followed.....	1401-1361
Bondage under the Moabites	1361-1343
Aod and peace in the south of Palestine.....	1343-1263
Bondage of the north of Palestine. Debora and Barac....	1323-1263
Bondage under the Madianites.....	1263-1256
Gedeon and peace.....	1256-1216

Abimelech.....	1216-1213
Thola	1213-1190
Jair	1190-1168
Heli and bondage under the Philistines (west of Palestine).....	1168-1128
Exploits of Samson.....	1148-1128
Samuel until the battle of Masphath.....	1128-1108
Bondage under the Ammonites (east of the Jordan).....	1168-1150
Jephte.....	1150-1144
Abesan	1144-1137
Abialon	1137-1127
Abdon.....	1127-1119
Samuel from the battle of Masphath until Saul.....	1108-1095
Saul.....	1095-1055
David.....	1055-1015
Salomon.....	1015- 975
Building of the Temple.....	1011
Accession of Roboam and of Jeroboam I.....	975
Death of Roboam and accession of Abia	958
Death of Abia and accession of Asa.....	955
Nadab succeeds to Jeroboam I.....	954
Assassination of Nadab and accession of Baasa.....	953
Ela succeeds Baasa.....	930
Zambri reigns seven days	930
Amri replaces him.....	930
Accession of Achab.....	918
Accession of Josaphat in Juda.....	914
Accession of Ochozias, son of Achab.....	897
Accession of Joram, son of Achab	896
Accession of Joram in Juda.....	889
Accession of Ochosias.....	884
Accession of Jehu	884
Accession of Athalia.....	883
Accession of Joas.....	877
Accession of Joachaz, son of Jehu	856
Accession of Joas, son of Joachaz.....	840
Accession of Amasias.....	838
Accession of Jeroboam II.....	824
Accession of Ozias, or Azarias	809
Accession of Zacharias, son of Jeroboam II.....	772
Accession of Sellum.....	772
Accession of Manahem.....	771
Accession of Phaceia, his son.....	761
Accession of Phacee	759
Accession of Joatham	757
Accession of Achaz.....	741
Accession of Osee	729

Accession of Ezechias.....	726
Taking of Samaria.....	721
Accession of Manasse.....	697
Accession of Amon.....	642
Accession of Josias.....	640
Accession of Joachaz.....	609
Accession of Joakim.....	609
First deportation to Babylon.....	606
Accession of Jechonias or Joachim.....	598
Accession of Sedecias.....	598
Taking of Jerusalem.....	587
Edict of Cyrus to rebuild Jerusalem, and return of Zorobabel..	536
Finishing of the second Temple.....	516
Return of Esdras.....	457
Return of Nehemias.....	445
Definitive departure of Nehemias for the court.....	433
Alexander visits Jerusalem.....	332
Era of the Seleucides	312
Antiochus Epiphanes takes Jerusalem.....	170
Insurrection of Mathathias.....	167
His death and the accession of Judas Machabeus.....	166
Restoration of the Temple.....	164
Death of Judas Machabeus.....	161
Jonathas, high priest.....	161- 143
Simon, ethnarch and high priest.....	143- 135
Independence of the Jewish nation.....	142
Death of Herod the Great and birth of Jesus.....	4
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Deposition of Archelaus and Coponius, first procurator of Judea...	6
Jesus in the midst of the Doctors.....	8
Marcus Ambivius, second procurator.....	9
Annius Rufus, third procurator.....	12
Death of Augustus, Tiberius, emperor.....	14
Valerius Gratus, fourth procurator.....	15
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Beginning of the public life of Jesus.....	26
Death of Jesus; Ascension and Pentecost.....	29
Death of Philip the tetrarch.....	33
Conversion of St. Paul.....	34
Removal of Pilate, who is replaced by Marcellus, sixth procurator	36
Death of Tiberius and accession of Caligula.....	37
Herod Agrippa becomes tetrarch of Trachonidis.....	37
Exile of Herod Antipas.....	39
Herod Agrippa becomes tetrarch of Galilee and of Perea.....	39
First voyage of St. Paul to Jerusalem.....	39
Murder of Caligula and accession of Claudius.....	41

Herod Agrippa is king of Judea	41
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Cumanus, ninth procurator.....	48
Felix, tenth procurator.....	52
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Vespasian, imperial legate in Syria.....	67
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Accession of Galba	68
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